DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: **Greene, Tweed & Co.**
Facility Address: **2075 Detwiler Road, Kulpsville, Pennsylvania 19443**
Facility EPA ID #: **PAD980555197**

1. Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units [SWMU], Regulated Units [RU], and Areas of Concern [AOC])

   [X] If yes – check here and continue with #2 below.

   [ ] If no – re-evaluate existing data, or

   [ ] If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

____ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

X If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The Greene, Tweed & Co. facility (Greene, Tweed or facility) facility is situated on approximately 30 acres of land in Kulpsville, Towamencin Township, Montgomery County, Pennsylvania. The facility is bordered to the northwest by Delp Drive, the southwest by Detwiler Road, and to the southeast by Gehman Road. The Pennsylvania Turnpike Northeast Extension (Route 476) is less than one mile to the southwest. Access to the facility is via one entrance on Detwiler Road, two entrances on Gehman Road, and one entrance on Delp Road. These entrances are unrestricted.

Land use surrounding the facility includes mixed commercial and residential neighborhoods. Two commercial buildings are located directly behind (northeast of) the facility. Residential areas are located approximately 450 feet northeast of these two buildings. Residential areas are also located directly east and southeast of the facility, beyond which is a local high school. Directly south and across Detwiler Road are several commercial buildings. Directly northwest of the facility, across Delp Drive, are medical device manufacturing facilities. A residence appears to be situated between these two facilities.

The facility consists of two buildings, the main building and the mill building. These buildings are accessible by card key access. The main building and parking areas were expanded from their original configuration in 2002. Presently, the main building is approximately 207,000 square feet and houses offices, manufacturing operations, and storage facilities for raw materials (e.g., pelletized polyetheretherketone [PEEK]). The facility's clean room manufacturing area is also located in the main building. Floor drains are located throughout the facility, including the shower and restroom areas. Dye trace testing previously conducted by the facility confirmed that the floor drains discharge into the Upper Gwynedd Towamencin Municipal Authority (UGTMA) sewer system. According to the facility representative, any process waters that are placed into the floor drains have been determined either to be non-hazardous or have been managed to ensure compliance with the conditions of the facility's discharge permit with the UGTMA. No notices of violations have been received from the UGTMA. The former hazardous waste storage area was located on the northeastern corner of the main building was moved to the northwestern side of the building when the main building was expanded in 2002. The 14,000 square foot mill building was constructed in 1999. The mill room, pre-form department, and mechanical laboratory were moved to this building.

Approximately 15 acres (50%) of the 30 acre property is covered with impermeable surfaces. The remaining 15 acres consists of grass-covered surfaces, landscaped areas, and the facility's stormwater retention pond, which is located at the rear (northeast) end of the property. The stormwater pond was constructed in approximately 2002 and receives only stormwater runoff from the building roofs and the parking areas. Public water and sewer utilities are provided to the facility.

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

Farmland occupied the property prior to 1971. Greene, Tweed began constructing the facility in 1971 and finished in 1978. Since that time, Greene, Tweed has always been the sole owner and operator of the facility (NUS Corporation [NUS], 1989).

The facility is an active manufacturer of specialty seals, gaskets, and custom engineered plastic components for the aerospace, defense, pharmaceutical, and chemical industries. The facility's main product lines currently include synthetic rubber, PEEK plastic, and plastics machining. The facility formerly produced raw urethane onsite. Small quantities of methylene chloride and xylene were used in the process to remove urethane polymer from finished products. The facility ceased production of raw urethane and the use of methylene chloride in the early 1990s. Urethane was replaced with PEEK which is currently purchased in pelletized form for use in the manufacturing operations. The facility also produced fabric rubber; however, this process was discontinued in the early 1990s.

Greene, Tweed is currently a large quantity generator (LQG) of hazardous waste (PAD980555197), maintains a State Only Operating Permit (SOOP) 46-0076 for air emissions, and has a National Pollutant Discharge Elimination System (NPDES) permit for stormwater (PAR230016).

Four solid waste management units (SWMUs) were identified at the facility: SWMU 1 – Former Hazardous Waste Storage Area, SWMU 2 – Former Methylene Chloride Waste Drum Area, SWMU 3 – Current Hazardous Waste Storage Area, and SWMU 4 – Waste Hydraulic Oil/Coolant Storage Area.

Waste Types and Quantities
On August 15, 1980, the facility submitted a Notification of Hazardous Waste Activity to the United States Environmental Protection Agency (USEPA) as a generator and treatment, storage, and disposal (TSD) facility. On August 18, 1980, the facility was assigned the temporary identification number PAT000621474. On November 17, 1980, the facility submitted a Part A Hazardous Waste Permit Application to the USEPA. On July 23, 1981, the USEPA completed the review process and granted the facility interim status. The permitted wastes included: D001 (ignitable), F001 (spent halogenated solvents in degreasing), F002 (spent halogenated solvents), and F011 (spent cyanide solutions from salt-bath pot cleaning from metal heat-treating operations). The process code listed was S01 (container storage).

On December 31, 1981, the facility was assigned the permanent USEPA ID No. PAD980555197.

According to the September 19, 1989 Preliminary assessment (PA) prepared by NUS, typical waste streams historically generated at the facility included Glydex (10% ammonia, 40% ethyl alcohol, 50% water), urethane, and laboratory waste streams. At the time of the PA, approximately 5,000 gallons of Glydex waste was generated annually. One drum of waste methylene chloride and xylene was generated per year from the urethane production process. One 55 gallon drum of laboratory waste (small quantities of toluene, methyl ethyl ketone [MEK], heptane, other solvents, and rubber) was generated per year in the research and development laboratories.

Currently, the facility generates Glydex and isopropanol that are managed as hazardous wastes. Waste methylene chloride and xylene generated during the urethane production process are no longer generated since this process was removed from the facility in the early 1990s. Glydex waste is stored in a 1,500-gallon aboveground storage tank (AST), (designated as AST 001A) situated in the current hazardous waste storage area located on the northwest side of the main building. A 1,500-gallon AST (AST 002A) containing virgin Glydex is situated adjacent to the waste AST. Drums of waste isopropanol are also stored in this containment area. The isopropanol waste is generated primarily in the clean room where it is typically sprayed onto towels used to clean equipment and products. Two drums of waste isopropanol were in the current hazardous waste storage area at the time of the 2011 site visit. According to the facility representative, Glydex waste comprises the majority of the hazardous wastes and has the potential to be flammable and corrosive.

The facility also generates non-hazardous waste hydraulic oil and coolant which is stored in 55 gallon drums in the waste hydraulic oil/coolant storage area located east of the current hazardous waste storage area.

SWMUs

SWMU 1 – Former Hazardous Waste Storage Area
This former SWMU, located outside the northeast corner of the main building, was used to store hazardous waste including Glydex, urethane, and laboratory wastes awaiting off-site disposal. Wastes were stored in 55-gallon drums or in a single 1,500 gallon AST (001A). The storage area was a 21 by 21 foot concrete pad with a six-inch high curb. The pad area was fenced with a six-foot high chain-link fence with wooden fencing on the northern and eastern faces. Operation began in 1978 and was active at the time of the 1989 PA. No known spills or releases occurred from this storage area at the time of the PA.

In 2002, the footprint of the main building was expanded to the north and the hazardous waste storage area was relocated to the northwest side of the main building. According to the facility representative, the hazardous waste storage area was demolished and the materials of construction were discarded. The facility provided documentation of soil sampling completed at SWMU 1 in 1992 at the request of PADEP, and documentation of integrity inspections completed on the two ASTs in 2002. Documentation for the 2002 closure of the storage area could not be located by the facility; however the results of the AST integrity inspection indicated that no contamination was observed or suspected.

SWMU 2 – Former Methylene Chloride Waste Drum Area
Formerly, methylene chloride was used to clean the product supply hoses used in the urethane production process. The waste methylene chloride was collected into a 55-gallon drum located in the urethane production area. When the drum was full, it was relocated to the former hazardous waste storage area (SWMU 1) within 90 days. The date of commencement for this area was unknown. As of the early 1990s, urethane was no longer manufactured at the facility; therefore, usage of methylene chloride and the collection drum was discontinued. The facility replaced use of urethane with PEEK, which is purchased in pelletized form and stored in the main building. At the time of the PA, no spills or releases were reported and no evidence of releases was observed in this area (NUS, 1989). At the time of the 2011 site visit, there was no evidence of the methylene chloride waste drum in the former urethane production area.

SWMU 3 – Current Hazardous Waste Storage Area
The current hazardous waste storage area is located on the northwest side of the main building. It consists of a 25 foot by 25 foot concrete pad with a six-inch high concrete curb on the northeast, northwest, and southeast sides. The cinderblock wall of the main building forms the southeast wall of the hazardous waste storage area. A two foot high concrete wall forms the southwest side. The storage area is under a roof and surrounded on the three open sides by a six-foot high chain link fence, which is gated and locked. The floor, curbing and walls appeared to be epoxy coated and in good condition. A one foot by one foot concrete-lined sump is located in the south corner. Both the virgin isopropanol and waste Glydex ASTs are located within the storage area. The facility also uses this storage area to store virgin and waste flammable liquids (isopropanol). At the time of the site visit, two 55-gallon drums of waste isopropanol (one was stored in an over pack drum due to leakage) and numerous drums of virgin isopropanol were stored in this area.

SWMU 4 – Waste Hydraulic Oil/Coolant Storage Area
Waste hydraulic oil and coolant are stored in the covered, open-sided storage area located east of the current hazardous waste storage area (SWMU 3). These wastes are managed as residual wastes by the facility. The storage area consists of a 20 foot by 20 foot concrete pad that is surrounded on the northeast, northwest, and southwest sides by a six-foot high concrete curb. There is no curb on the southeast side of the storage area. The concrete outside the storage area has been recently patched (there are joints in the surface). The curb on the northwest and southwest sides is level with the grass surface. A small grass area is located directly outside of the northeast corner. The concrete pad is sloped toward the northwest corner. A small amount of precipitation was observed pooled in this corner. The storage area is surrounded by a six-foot high chain link fence that is gated and locked. The 55-gallon drums are stored directly on the concrete pad. At the time of the site visit, 23 drums of waste hydraulic oil and coolant were stored in this area. The majority of the drums were in good condition; however, at least one drum was significantly dented. There appeared to be no evidence of spills on the observable portions of the concrete pad, and the surrounding vegetation appeared healthy.

Storage Tanks
Based on available documentation, four underground storage tanks (USTs) and three ASTs were located at the facility. According to the facility representative, two USTs were formerly used to store boiler blowdown to discharge to Outfall

001. The USTs were used to allow the water too cool, as well as to stabilize the flow to the outfall. The USTs were less than 300 gallons and are located directly outside of the boiler room. The USTs remain in place, but are no longer used. Tow USTs were used to store fuel oil; they were removed in 2002. The facility continues to operate the ASTs, which are currently registered under facility identification 46-10487. ASTs 001A (virgin isopropanol) and 002A (waste Glydex) are located in the current hazardous waste storage area. AST integrity inspections completed on these two ASTs on October 24, 2002 show that the ASTs were in good condition with no observed or suspected contamination. (Note: These ASTs were situated in the former hazardous waste storage area (at the time of the integrity inspection [2002].) AST 003A (liquid nitrogen) is located approximately 125 feet southeast of the current hazardous waste storage area, immediately outside the backup room. During the 2011 site visit, a second liquid nitrogen AST (un-numbered) that is identical to Tank 003A was identified in a room within the mechanical lab. This AST is located between the main building and the mill building.

Investigations

Former Hazardous Waste Storage Area Soil Sampling

In the March 26, 1992 PADEP inspection report, it was noted that two large cracks were observed running across the concrete pad of the former hazardous waste storage area (SWMU 1) and open drain pipes were observed in the walls of the containment area. The report stated that the soils surrounding and downgradient of the storage area should be sampled and analyzed for any waste materials that had been stored.

According to an August 11, 1992 report prepared by Spotts, Stevens, and McCoy, Inc. (SSM) for the facility, four soil samples were collected in the drainage swale near the former hazardous waste storage area on July 16, 1992. The samples were collected at an approximate depth of one foot below ground surface (bgs) utilizing a bucket auger. Samples S-l, S-2, and S-3 were analyzed for ethanol (ethyl alcohol), toluene, MEK, and total petroleum hydrocarbons (TPH). In addition, sample S-1 was analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Sample S-4 was analyzed for TPH only. The report concluded that the soil adjacent to the former hazardous waste storage area had not been adversely impacted by rainwater runoff from the concrete pad and no further action was required.

No. 6 Fuel Oil UST Releases

According to the PA (NUS, 1989), the 20,000-gallon UST containing No. 6 fuel oil (UST 001) was discovered to have leaked. PADEP inspection reports dated May 20, 1983; May 25, 1983; May 26, 1983; May 27, 1983; June 8, 1983; July 11, 1983; September 1, 1983; and April 2, 1984 indicate that the facility notified PADEP of the release in May 1983. Oil-saturated soil was observed in the excavation during removal of the UST and approximately one inch of oil was observed on water entering the excavation. In addition, No. 6 fuel oil was observed in the drainage swale located behind the facility. It was believed that the oil was migrating along underground utility lines to the drainage swale. The facility installed oil/water separators. The contents were vacuum pumped regularly. On September 27, 1983, the facility notified PADEP that 1,450 gallons of No. 6 fuel oil was recovered.

No leaks were identified from the other UST (UST 002; 15,000 gallons containing No. 4 fuel oil). PADEP required the facility to install six monitoring wells. Sampling of the existing monitoring wells did not show any indication of oil contamination; however, the monitoring wells would continue to be sampled monthly for one year.

PADEP's inspection reports dated July 11, 1983; September 1, 1983; and April 2, 1984 state that all contaminated soil was removed and oil was not observed in any of the monitoring wells. The PA indicates that 110 cubic yards of contaminated soils were removed and the UST was repaired (NUS, 1989). The PA also states that soil samples were collected by PADEP before and after soil removal. Documentation of the soil and groundwater sample analytical results could not be located by the facility representative; however, the representative stated that facility personnel present during the cleanup activities stated the results were found to be satisfactory by PADEP (facility communication, 2011).

On February 8, 2002, PADEP received an incident notification for a large release impacting Skippack Creek (later determined to be 200 gallons of No. 6 fuel oil) following a refueling event at the facility. The leak reportedly originated from the 20,000 gallon UST containing No. 2 fuel oil (UST 001) and the 15,000 gallon UST containing No. 4 fuel oil (UST 002). (Note: Through its operational history, the facility varied heating oils stored in each UST. These are the same USTs that were the focus of the 1983 release.) The 200 gallons of released oil migrated across the asphalt parking lot, into a stormwater drainage pipe, and into a drainage swale located on the north end of the facility. An estimated 50 gallons of

oil impacted the property located at 1508-1510 Delp Drive.

Drainage Swale Remediation

The initial cleanup of the impacted drainage swale consisted of the placement and maintenance of oil-absorbent booms and spill pads along the impacted area and waterways. The February 8, 2002 incident inspection notes indicated that the two USTs were immediately emptied and emergency spill response was conducted. Three tons of soils were removed from the grass-lined drainage swale using hand tools. On February 12, 2002, PADEP confirmed that the drainage swale was not a wetland via a documented telephone conversation. Approximately 41 tons of impacted soils were excavated from the drainage swale. The depth of the impacted soil on the southwestern portion of the excavation extended to approximately 3.5 to four feet bgs, while the depth of the impacted soil in most other portions of the excavation extended to a maximum depth of two feet bgs. The horizontal extent of the excavation followed the general shape of the drainage swale, and the final dimensions of the excavation were approximately 200 feet long by two to 18 feet wide. The excavation extended to a maximum depth of approximately 4.5 feet below the former base of the area.

Additionally, the storm sewer outlet leading to the drainage swale was fitted with additional booms and a settlement basin to act as a temporary oil/water separator to collect any residual oil that could potentially discharge from the storm sewer outlet. As a final measure, a combination vacuum/jet truck equipped with a high-pressure pipe cleaning nozzle was used to power-wash out the interior of the storm sewer while collecting the wash water. All wash water from the cleaning event was captured and disposed of as potentially impacted water.

All drainage swale remedial activities were preformed in accordance with the Land Recycling and Environmental Remediation Standards Act (Act 2).

PADEP conducted an inspection and on February 11, 2002 and sent the facility guidance to properly close the USTs and achieve compliance with the Clean Streams Law. The two USTs were removed between February 23 and 26, 2002. Impacted soil and free product were observed around the former UST locations. The impacted soil extended to weathered bedrock which was encountered at approximately five feet bgs within the excavation. Impacted material was removed from the excavation and properly disposed. Free product was observed on the surface of perched water within the excavation. To remove free product on the shallow groundwater surface within the excavation, several enhanced fluid recovery (EFR) pump outs of groundwater within the open excavation were conducted. Between EFR events, oil-only absorbent booms and pads were placed in the excavation to recover any product entering the excavation. The EFR events and placement and maintenance of oil absorbent pads and booms were continued until no free product was observed and the sheen on the groundwater surface was eliminated. The UST tank remedial activities were preformed in accordance with Act 2.

Following the removal of impacted soil and free product from the groundwater surface within the excavation, post-excavation attainment soil samples were collected, and the facility initiated a groundwater investigation. The results of the soil and groundwater samples were presented in the Act 2 Final Report. Groundwater in the weathered portion of the Brunswick Formation is typically under water table or semi-artesian conditions (NUS, 1989). Depths to groundwater measured in the shallow groundwater wells (15 to 20 feet deep) installed outside of the underground storage tank (UST) excavation at the facility suggest a southerly flow direction toward Detwiler Road. The shallowest depths to groundwater measured in these wells ranged from 3.68 feet bgs on the north side of the excavation to 9.59 feet bgs on the south side of the excavation. Depths to groundwater measured in the three bedrock wells located at the facility ranged from approximately 65 feet bgs on the southwest side of the facility to 70 feet bgs in a similarly constructed well on the northeast side of the facility. The depth to groundwater measured in a shallower bedrock well located between these two wells was 46 feet bgs.

Act 2 – Final Report
In January 2009, the facility sent the Final Report to PADEP. It concluded that all cleanup objectives were met, attainment of PADEP's residential Statewide Health Standard (SHS) was demonstrated, and no exposure existed.

Vapor Intrusion Pathway Evaluation: Using the soil and groundwater analytical data, the vapor intrusion pathway was evaluated in accordance with the PADEP Act 2 vapor intrusion guidance (specifically, Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard). The report states that because the soil and groundwater data did not identify any target analytes at concentrations exceeding the indoor air quality (IAQ) screening thresholds, the IAQ exposure pathway was incomplete and no further evaluation of the vapor intrusion pathway was necessary.

On May 5, 2009, PADEP acknowledged that the facility had demonstrated attainment of the residential SHS for the constituents of No. 2, 4, and 6 fuel oils in both soil and groundwater related to the release at the former 20,000 gallon and 15,000 gallon USTs.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

____ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

   If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

   If no - enter "NO" status code in #8.

   If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

X YE -Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the **Greene, Tweed & Co.** facility, EPA ID # **PAD980555197,** located at **2075 Detwiler Road, Kulpsville, Pennsylvania 19443.** Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

____ IN - More information is needed to make a determination.

Completed by (signature) _____ Date _____

(print) _____

(title) _____

Supervisor (signature) _____ Date _____

(print) _____

(title) _____

(EPA Region or State) _____

Locations where References may be found:

USEPA Region III
Waste and Chemical Mgmt. Division
1650 Arch Street
Philadelphia, PA 19103

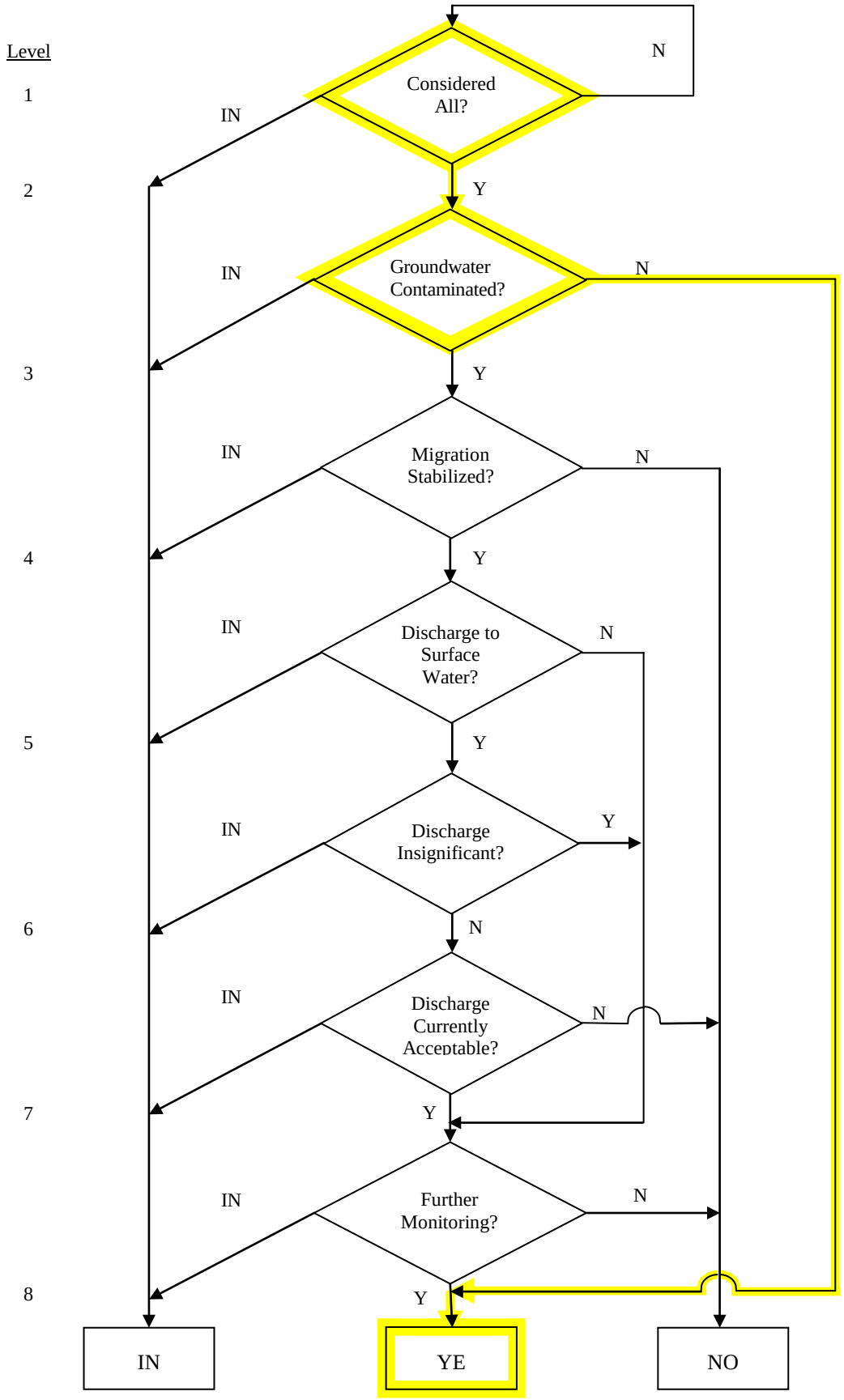
PADEP
South East Regional Office
2 E. Main Street
Norristown, PA 19401

Contact telephone and e-mail numbers

(name) _____
(phone#) _____
(e-mail) _____

Facility Name:	Greene, Tweed & Co.
EPA ID#	PAD980555197
City/State	Kulpsville, Pennsylvania 19443

MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL (CA 750)



DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

Facility Name: **Greene, Tweed & Co.**
Facility Address: **2075 Detwiler Road, Kulpsville, Pennsylvania 19443**
Facility EPA ID #: **PAD980555197**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   [X] If yes – check here and continue with #2 below.

   [ ] If no – re-evaluate existing data, or

   [ ] If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility [i.e., site-wide]).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale/Key Contaminants
Groundwater		**X**		Act 2 Final Report demonstrated attainment of residential Statewide Health Standards for groundwater.
Air (indoors) [2]		**X**		IAQ exposure pathway was incomplete.
Surface Soil (e.g., <2 ft)		**X**		Act 2 Final Report demonstrated attainment of residential Statewide Health Standards for soil.
Surface Water		**X**		Drainage swale remedial activities were preformed in accordance with Act 2.
Sediment		**X**		Drainage swale remedial activities were preformed in accordance with Act 2.
Subsurf. Soil (e.g., >2 ft)		**X**		Act 2 Final Report demonstrated attainment of residential Statewide Health Standards for soil.
Air (outdoors)		**X**		Facility maintains a State Only Operating Permit (SOOP) 46-0076 for air emissions. No violations.

X If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

____ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter "IN" status code.

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Rationale and Reference(s):
The Greene, Tweed & Co. facility (Greene, Tweed or facility) facility is situated on approximately 30 acres of land in Kulpsville, Towamencin Township, Montgomery County, Pennsylvania. The facility is bordered to the northwest by Delp Drive, the southwest by Detwiler Road, and to the southeast by Gehman Road. The Pennsylvania Turnpike Northeast Extension (Route 476) is less than one mile to the southwest. Access to the facility is via one entrance on Detwiler Road, two entrances on Gehman Road, and one entrance on Delp Road. These entrances are unrestricted.

Land use surrounding the facility includes mixed commercial and residential neighborhoods. Two commercial buildings are located directly behind (northeast of) the facility. Residential areas are located approximately 450 feet northeast of these two buildings. Residential areas are also located directly east and southeast of the facility, beyond which is a local high school. Directly south and across Detwiler Road are several commercial buildings. Directly northwest of the facility, across Delp Drive, are medical device manufacturing facilities. A residence appears to be situated between these two facilities.

The facility consists of two buildings, the main building and the mill building. These buildings are accessible by card key access. The main building and parking areas were expanded from their original configuration in 2002. Presently, the main building is approximately 207,000 square feet and houses offices, manufacturing operations, and storage facilities for raw materials (e.g., pelletized polyetheretherketone [PEEK]). The facility's clean room manufacturing area is also located in the main building. Floor drains are located throughout the facility, including the shower and restroom areas. Dye trace testing previously conducted by the facility confirmed that the floor drains discharge into the Upper Gwynedd Towamencin Municipal Authority (UGTMA) sewer system. According to the facility representative, any process waters that are placed into the floor drains have been determined either to be non-hazardous or have been managed to ensure compliance with the conditions of the facility's discharge permit with the UGTMA. No notices of violations have been received from the UGTMA. The former hazardous waste storage area was located on the northeastern corner of the main building was moved to the northwestern side of the building when the main building was expanded in 2002. The 14,000 square foot mill building was constructed in 1999. The mill room, pre-form department, and mechanical laboratory were moved to this building.

Approximately 15 acres (50%) of the 30 acre property is covered with impermeable surfaces. The remaining 15 acres consists of grass-covered surfaces, landscaped areas, and the facility's stormwater retention pond, which is located at the rear (northeast) end of the property. The stormwater pond was constructed in approximately 2002 and receives only stormwater runoff from the building roofs and the parking areas. Public water and sewer utilities are provided to the facility.

Farmland occupied the property prior to 1971. Greene, Tweed began constructing the facility in 1971 and finished in 1978. Since that time, Greene, Tweed has always been the sole owner and operator of the facility (NUS Corporation [NUS], 1989).

The facility is an active manufacturer of specialty seals, gaskets, and custom engineered plastic components for the aerospace, defense, pharmaceutical, and chemical industries. The facility's main product lines currently include synthetic rubber, PEEK plastic, and plastics machining. The facility formerly produced raw urethane onsite. Small quantities of methylene chloride and xylene were used in the process to remove urethane polymer from finished products. The facility ceased production of raw urethane and the use of methylene chloride in the early 1990s. Urethane was replaced with PEEK which is currently purchased in pelletized form for use in the manufacturing operations. The facility also produced fabric rubber; however, this process was discontinued in the early 1990s.

Greene, Tweed is currently a large quantity generator (LQG) of hazardous waste (PAD980555197), maintains a State Only Operating Permit (SOOP) 46-0076 for air emissions, and has a National Pollutant Discharge Elimination System (NPDES) permit for stormwater (PAR230016).

Four solid waste management units (SWMUs) were identified at the facility: SWMU 1 – Former Hazardous Waste Storage Area, SWMU 2 – Former Methylene Chloride Waste Drum Area, SWMU 3 – Current Hazardous Waste Storage Area, and SWMU 4 – Waste Hydraulic Oil/Coolant Storage Area.

Waste Types and Quantities
On August 15, 1980, the facility submitted a Notification of Hazardous Waste Activity to the United States Environmental Protection Agency (USEPA) as a generator and treatment, storage, and disposal (TSD) facility. On August 18, 1980, the facility was assigned the temporary identification number PAT000621474. On November 17, 1980, the facility submitted a Part A Hazardous Waste Permit Application to the USEPA. On July 23, 1981, the USEPA completed the review process and granted the facility interim status. The permitted wastes included: D001 (ignitable), F001 (spent halogenated solvents in degreasing), F002 (spent halogenated solvents), and F011 (spent cyanide solutions from salt-bath pot cleaning from metal heat-treating operations). The process code listed was S01 (container storage).

On December 31, 1981, the facility was assigned the permanent USEPA ID No. PAD980555197.

According to the September 19, 1989 Preliminary assessment (PA) prepared by NUS, typical waste streams historically generated at the facility included Glydex (10% ammonia, 40% ethyl alcohol, 50% water), urethane, and laboratory waste streams. At the time of the PA, approximately 5,000 gallons of Glydex waste was generated annually. One drum of waste methylene chloride and xylene was generated per year from the urethane production process. One 55 gallon drum of laboratory waste (small quantities of toluene, methyl ethyl ketone [MEK], heptane, other solvents, and rubber) was generated per year in the research and development laboratories.

Currently, the facility generates Glydex and isopropanol that are managed as hazardous wastes. Waste methylene chloride and xylene generated during the urethane production process are no longer generated since this process was removed from the facility in the early 1990s. Glydex waste is stored in a 1,500-gallon aboveground storage tank (AST), (designated as AST 001A) situated in the current hazardous waste storage area located on the northwest side of the main building. A 1,500-gallon AST (AST 002A) containing virgin Glydex is situated adjacent to the waste AST. Drums of waste isopropanol are also stored in this containment area. The isopropanol waste is generated primarily in the clean room where it is typically sprayed onto towels used to clean equipment and products. Two drums of waste isopropanol were in the current hazardous waste storage area at the time of the 2011 site visit. According to the facility representative, Glydex waste comprises the majority of the hazardous wastes and has the potential to be flammable and corrosive.

The facility also generates non-hazardous waste hydraulic oil and coolant which is stored in 55 gallon drums in the waste hydraulic oil/coolant storage area located east of the current hazardous waste storage area.

SWMUs

<u>SWMU 1 – Former Hazardous Waste Storage Area</u>
This former SWMU, located outside the northeast corner of the main building, was used to store hazardous waste including Glydex, urethane, and laboratory wastes awaiting off-site disposal. Wastes were stored in 55-gallon drums or in a single 1,500 gallon AST (001A). The storage area was a 21 by 21 foot concrete pad with a six-inch high curb. The pad area was fenced with a six-foot high chain-link fence with wooden fencing on the northern and eastern faces. Operation began in 1978 and was active at the time of the 1989 PA. No known spills or releases occurred from this storage area at the time of the PA.

In 2002, the footprint of the main building was expanded to the north and the hazardous waste storage area was relocated to the northwest side of the main building. According to the facility representative, the hazardous waste storage area was demolished and the materials of construction were discarded. The facility provided documentation of soil sampling completed at SWMU 1 in 1992 at the request of PADEP, and documentation of integrity inspections completed on the two ASTs in 2002. Documentation for the 2002 closure of the storage area could not be located by the facility; however the

results of the AST integrity inspection indicated that no contamination was observed or suspected.

SWMU 2 – Former Methylene Chloride Waste Drum Area

Formerly, methylene chloride was used to clean the product supply hoses used in the urethane production process. The waste methylene chloride was collected into a 55-gallon drum located in the urethane production area. When the drum was full, it was relocated to the former hazardous waste storage area (SWMU 1) within 90 days. The date of commencement for this area was unknown. As of the early 1990s, urethane was no longer manufactured at the facility; therefore, usage of methylene chloride and the collection drum was discontinued. The facility replaced use of urethane with PEEK, which is purchased in pelletized form and stored in the main building. At the time of the PA, no spills or releases were reported and no evidence of releases were observed in this area (NUS, 1989). At the time of the 2011 site visit, there was no evidence of the methylene chloride waste drum in the former urethane production area.

SWMU 3 – Current Hazardous Waste Storage Area

The current hazardous waste storage area is located on the northwest side of the main building. It consists of a 25 foot by 25 foot concrete pad with a six-inch high concrete curb on the northeast, northwest, and southeast sides. The cinderblock wall of the main building forms the southeast wall of the hazardous waste storage area. A two foot high concrete wall forms the southwest side. The storage area is under a roof and surrounded on the three open sides by a six-foot high chain link fence, which is gated and locked. The floor, curbing and walls appeared to be epoxy coated and in good condition. A one foot by one foot concrete-lined sump is located in the south corner. Both the virgin isopropanol and waste Glydex ASTs are located within the storage area. The facility also uses this storage area to store virgin and waste flammable liquids (isopropanol). At the time of the site visit, two 55-gallon drums of waste isopropanol (one was stored in an over pack drum due to leakage) and numerous drums of virgin isopropanol were stored in this area.

SWMU 4 – Waste Hydraulic Oil/Coolant Storage Area

Waste hydraulic oil and coolant are stored in the covered, open-sided storage area located east of the current hazardous waste storage area (SWMU 3). These wastes are managed as residual wastes by the facility. The storage area consists of a 20 foot by 20 foot concrete pad that is surrounded on the northeast, northwest, and southwest sides by a six-foot high concrete curb. There is no curb on the southeast side of the storage area. The concrete outside the storage area has been recently patched (there are joints in the surface). The curb on the northwest and southwest sides is level with the grass surface. A small grass area is located directly outside of the northeast corner. The concrete pad is sloped toward the northwest corner. A small amount of precipitation was observed pooled in this corner. The storage area is surrounded by a six-foot high chain link fence that is gated and locked. The 55-gallon drums are stored directly on the concrete pad. At the time of the site visit, 23 drums of waste hydraulic oil and coolant were stored in this area. The majority of the drums were in good condition; however, at least one drum was significantly dented. There appeared to be no evidence of spills on the observable portions of the concrete pad, and the surrounding vegetation appeared healthy.

Storage Tanks

Based on available documentation, four underground storage tanks (USTs) and three ASTs were located at the facility. According to the facility representative, two USTs were formerly used to store boiler blowdown to discharge to Outfall 001. The USTs were used to allow the water too cool, as well as to stabilize the flow to the outfall. The USTs were less than 300 gallons and are located directly outside of the boiler room. The USTs remain in place, but are no longer used. Tow USTs were used to store fuel oil; they were removed in 2002. The facility continues to operate the ASTs, which are currently registered under facility identification 46-10487. ASTs 001A (virgin isopropanol) and 002A (waste Glydex) are located in the current hazardous waste storage area. AST integrity inspections completed on these two ASTs on October 24, 2002 show that the ASTs were in good condition with no observed or suspected contamination. (Note: These ASTs were situated in the former hazardous waste storage area (at the time of the integrity inspection [2002].) AST 003A (liquid nitrogen) is located approximately 125 feet southeast of the current hazardous waste storage area, immediately outside the backup room. During the 2011 site visit, a second liquid nitrogen AST (un-numbered) that is identical to Tank 003A was identified in a room within the mechanical lab. This AST is located between the main building and the mill building.

Investigations

Former Hazardous Waste Storage Area Soil Sampling

In the March 26, 1992 PADEP inspection report, it was noted that two large cracks were observed running across the concrete pad of the former hazardous waste storage area (SWMU 1) and open drain pipes were observed in the walls of the containment area. The report stated that the soils surrounding and downgradient of the storage area should be sampled and analyzed for any waste materials that had been stored.

According to an August 11, 1992 report prepared by Spotts, Stevens, and McCoy, Inc. (SSM) for the facility, four soil samples were collected in the drainage swale near the former hazardous waste storage area on July 16, 1992. The samples were collected at an approximate depth of one foot below ground surface (bgs) utilizing a bucket auger. Samples S-l, S-2, and S-3 were analyzed for ethanol (ethyl alcohol), toluene, MEK, and total petroleum hydrocarbons (TPH). In addition, sample S-1 was analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Sample S-4 was analyzed for TPH only. The report concluded that the soil adjacent to the former hazardous waste storage area had not been adversely impacted by rainwater runoff from the concrete pad and no further action was required.

No. 6 Fuel Oil UST Releases

According to the PA (NUS, 1989), the 20,000-gallon UST containing No. 6 fuel oil (UST 001) was discovered to have leaked. PADEP inspection reports dated May 20, 1983; May 25, 1983; May 26, 1983; May 27, 1983; June 8, 1983; July 11, 1983; September 1, 1983; and April 2, 1984 indicate that the facility notified PADEP of the release in May 1983. Oil-saturated soil was observed in the excavation during removal of the UST and approximately one inch of oil was observed on water entering the excavation. In addition, No. 6 fuel oil was observed in the drainage swale located behind the facility. It was believed that the oil was migrating along underground utility lines to the drainage swale. The facility installed oil/water separators. The contents were vacuum pumped regularly. On September 27, 1983, the facility notified PADEP that 1,450 gallons of No. 6 fuel oil was recovered.

No leaks were identified from the other UST (UST 002; 15,000 gallons containing No. 4 fuel oil). PADEP required the facility to install six monitoring wells. Sampling of the existing monitoring wells did not show any indication of oil contamination; however, the monitoring wells would continue to be sampled monthly for one year.

PADEP's inspection reports dated July 11, 1983; September 1, 1983; and April 2, 1984 state that all contaminated soil was removed and oil was not observed in any of the monitoring wells. The PA indicates that 110 cubic yards of contaminated soils were removed and the UST was repaired (NUS, 1989). The PA also states that soil samples were collected by PADEP before and after soil removal. Documentation of the soil and groundwater sample analytical results could not be located by the facility representative; however, the representative stated that facility personnel present during the cleanup activities stated the results were found to be satisfactory by PADEP (facility communication, 2011).

On February 8, 2002, PADEP received an incident notification for a large release impacting Skippack Creek (later determined to be 200 gallons of No. 6 fuel oil) following a refueling event at the facility. The leak reportedly originated from the 20,000 gallon UST containing No. 2 fuel oil (UST 001) and the 15,000 gallon UST containing No. 4 fuel oil (UST 002). (Note: Through its operational history, the facility varied heating oils stored in each UST. These are the same USTs that were the focus of the 1983 release.) The 200 gallons of released oil migrated across the asphalt parking lot, into a stormwater drainage pipe, and into a drainage swale located on the north end of the facility. An estimated 50 gallons of oil impacted the property located at 1508-1510 Delp Drive.

Drainage Swale Remediation

The initial cleanup of the impacted drainage swale consisted of the placement and maintenance of oil-absorbent booms and spill pads along the impacted area and waterways. The February 8, 2002 incident inspection notes indicated that the two USTs were immediately emptied and emergency spill response was conducted. Three tons of soils were removed from the grass-lined drainage swale using hand tools. On February 12, 2002, PADEP confirmed that the drainage swale was not a

wetland via a documented telephone conversation. Approximately 41 tons of impacted soils were excavated from the drainage swale. The depth of the impacted soil on the southwestern portion of the excavation extended to approximately 3.5 to four feet bgs, while the depth of the impacted soil in most other portions of the excavation extended to a maximum depth of two feet bgs. The horizontal extent of the excavation followed the general shape of the drainage swale, and the final dimensions of the excavation were approximately 200 feet long by two to 18 feet wide. The excavation extended to a maximum depth of approximately 4.5 feet below the former base of the area.

Additionally, the storm sewer outlet leading to the drainage swale was fitted with additional booms and a settlement basin to act as a temporary oil/water separator to collect any residual oil that could potentially discharge from the storm sewer outlet. As a final measure, a combination vacuum/jet truck equipped with a high-pressure pipe cleaning nozzle was used to power-wash out the interior of the storm sewer while collecting the wash water. All wash water from the cleaning event was captured and disposed of as potentially impacted water.

All drainage swale remedial activities were preformed in accordance with the Land Recycling and Environmental Remediation Standards Act (Act 2).

PADEP conducted an inspection and on February 11, 2002 and sent the facility guidance to properly close the USTs and achieve compliance with the Clean Streams Law. The two USTs were removed between February 23 and 26, 2002. Impacted soil and free product were observed around the former UST locations. The impacted soil extended to weathered bedrock which was encountered at approximately five feet bgs within the excavation. Impacted material was removed from the excavation and properly disposed. Free product was observed on the surface of perched water within the excavation. To remove free product on the shallow groundwater surface within the excavation, several enhanced fluid recovery (EFR) pump outs of groundwater within the open excavation were conducted. Between EFR events, oil-only absorbent booms and pads were placed in the excavation to recover any product entering the excavation. The EFR events and placement and maintenance of oil absorbent pads and booms were continued until no free product was observed and the sheen on the groundwater surface was eliminated. The UST tank remedial activities were preformed in accordance with Act 2.

Following the removal of impacted soil and free product from the groundwater surface within the excavation, post-excavation attainment soil samples were collected, and the facility initiated a groundwater investigation. The results of the soil and groundwater samples were presented in the Act 2 Final Report.

The facility is situated within the Triassic Lowlands Section of the Piedmont Physiographic Province. The area has a dendritic drainage pattern. Regional topography consists of broad, shallow valleys and rolling hills; however, the facility property is relatively flat, sloping gently to the north-northwest. The majority of the facility is underlain by Reaville Series soil, which is a moderately deep, somewhat poorly drained, reddish shaly silt loam. This soil has slow permeability, moderate to low available water capacity, and is strongly to slightly acid. The northern and eastern fringes of the property are underlain by Abbottstown Series soil, which is a deep, somewhat poorly drained silt loam that formed in material weathered from red and brown shale and sandstone. This soil has low permeability, high moisture-holding capacity, and is very strongly to medium acid. According to the Act 2 Final Report, Klinesville Series soil is also present on the property. Klinesville Series soil consists of reddish-brown very shaly silt loam that has moderately rapid permeability and rapid surface runoff. Soil encountered during subsurface investigation activities conducted at the facility was described as brown and reddish brown silt. Soil rich in organic matter was observed in the densely vegetated stormwater drainage swale located along Delp Drive.

Bedrock is reported to be shallow beneath the facility. Monitoring well boring logs for three shallow wells installed at the facility show that red weathered shale was encountered between five and six feet below ground surface (bgs), while competent red shale was encountered at approximately 10 feet bgs (Environmental Maintenance Company, Inc. [EMC], 2009). The bedrock encountered beneath the facility is reportedly of the Brunswick Formation, which consists of very fine-grained reddish-brown shale, mudstone, and siltstone. The Brunswick Formation has moderate to low permeability,

moderate secondary porosity due to moderately developed, vertical, blocky fractures, and is moderately resistant to weathering (EMC, 2009).

Groundwater in the weathered portion of the Brunswick Formation is typically under water table or semi-artesian conditions (NUS, 1989). Depths to groundwater measured in the shallow groundwater wells (15 to 20 feet deep) installed outside of the underground storage tank (UST) excavation at the facility suggest a southerly flow direction toward Detwiler Road. The shallowest depths to groundwater measured in these wells ranged from 3.68 feet bgs on the north side of the excavation to 9.59 feet bgs on the south side of the excavation. Depths to groundwater measured in the three bedrock wells located at the facility ranged from approximately 65 feet bgs on the southwest side of the facility to 70 feet bgs in a similarly constructed well on the northeast side of the facility. The depth to groundwater measured in a shallower bedrock well located between these two wells was 46 feet bgs.

Act 2 – Final Report

In January 2009, the facility sent the Final Report to PADEP. It concluded that all cleanup objectives were met, attainment of PADEP's residential Statewide Health Standard (SHS) was demonstrated, and no exposure existed.

Vapor Intrusion Pathway Evaluation: Using the soil and groundwater analytical data, the vapor intrusion pathway was evaluated in accordance with the PADEP Act 2 vapor intrusion guidance (specifically, Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard). The report states that because the soil and groundwater data did not identify any target analytes at concentrations exceeding the indoor air quality (IAQ) screening thresholds, the IAQ exposure pathway was incomplete and no further evaluation of the vapor intrusion pathway was necessary.

On May 5, 2009, PADEP acknowledged that the facility had demonstrated attainment of the residential SHS for the constituents of No. 2, 4, and 6 fuel oils in both soil and groundwater related to the release at the former 20,000 gallon and 15,000 gallon USTs.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

	Potential **Human Receptors** (Under Current Conditions)						
Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater							
Air (indoors)							
Soil (surface, e.g., <2 ft.							
Surface Water							
Sediment							
Soil (subsurface e.g., >2 ft.							
Air (outdoors)							

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

_____ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

____ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable") - continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the Information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the **Greene, Tweed & Co.** facility, EPA ID # **PAD980555197**, located at **2075 Detwiler Road, Kulpsville, Pennsylvania 19443** under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by (signature) _____ Date _____

(print) _____

(title) _____

Supervisor (signature) _____ Date _____

(print) _____

(title) _____

(EPA Region or State) _____

Locations where References may be found:

USEPA Region III
Waste and Chemical Mgmt. Division
1650 Arch Street
Philadelphia, PA 19103

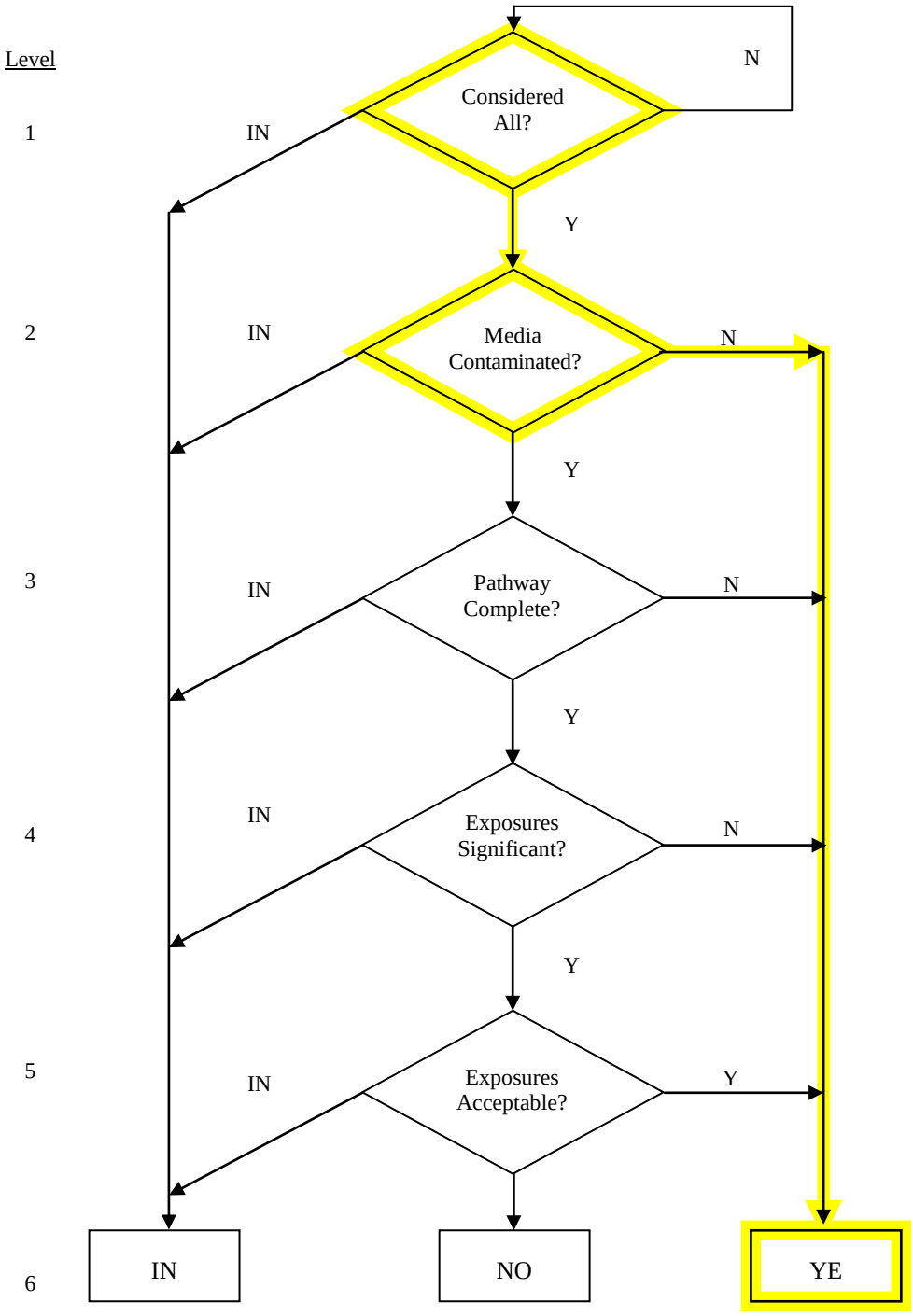
PADEP
South East Regional Office
2 E. Main Street
Norristown, PA 19401

Contact telephone and e-mail numbers
(signature) _____
(print) _____
(title) _____

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Facility Name:	Greene, Tweed & Co.
EPA ID#	PAD980555197
City/State	Kulpsville, Pennsylvania 19443

CURRENT HUMAN EXPOSURES UNDER CONTROL (CA725)



United States Environmental Protection Agency
Region III
Corrective Action Program

Environmental Indicator Inspection Report
For

Greene, Tweed & Co.
2075 Detwiler Road
Kulpsville, Pennsylvania 19443

USEPA ID No. PAD980555197

Prepared By

Baker

December 2011

TABLE OF CONTENTS

LIST OF APPENDICES

RCRA SITE INSPECTION REPORT

Purpose: To gather relevant information from Greene, Tweed & Co. (Greene, Tweed or facility), in order to determine whether human exposures and groundwater releases are controlled, as per Environmental Indicator (EI) Determination forms.

Documentation Review: Prior to the site visit, Michael Baker Jr., Inc. (Baker) personnel conducted an extensive records review of the Pennsylvania Department of Environmental Protection (PADEP) Southeast Regional Office and the United States Environmental Protection Agency (USEPA) Region III Philadelphia Office files. Additional documentation relative to closure of the former hazardous waste storage area, subsurface investigation activities, and waste characterization were provided by the facility after the site visit.

Attendees at Site Inspection:

Name	Organization	Phone Number	E-Mail address
Tom Klopp	Greene, Tweed	267-932-5606	tklopp@gtweed.com
Jeanna Henry	USEPA	215-814-2820	henry.jeannar@epamail.epa.gov
Tina Entenman	Baker	717-221-2061	tentenman@mbakercorp.com

Meeting Summary: A meeting at the facility was held with the attendees noted above on April 19, 2011. Ms. Entenman presented the facility with information regarding USEPA Region III's Corrective Action process, the EI Assessment Program and the legislation driving this program. Under this investigation, USEPA Region III is focusing on two interim EIs to evaluate whether any unacceptable risk to human health and/or the environment is ongoing at each priority facility. The two indicators are determining if human exposures are controlled and groundwater releases are controlled. Prior to and during the site visit, outstanding issues and discrepancies encountered in the file review summary were discussed.

The site visit continued with an overview of areas to be observed and a tour of the facility. Photographs of the facility are presented in Appendix A: Photographs.

A. Location and Operational History of the Facility, Including all Wastes Generated at the Facility and their Management

Site Layout and Background Information

Site Layout

The facility is situated on approximately 30 acres of land in Kulpsville (a census designated place [CDP]), Towamencin Township, Montgomery County, Pennsylvania (Appendix B: Figure 1 - Facility Location Map). The facility is bordered to the northwest by Delp Drive, the southwest by Detwiler Road, and to the southeast by Gehman Road. The Pennsylvania Turnpike Northeast Extension (Route 476) is less than one mile to the southwest. Access to the facility is via one entrance on Detwiler Road, two entrances on Gehman Road, and one entrance on Delp Road. These entrances are unrestricted.

Land use surrounding the facility includes mixed commercial and residential neighborhoods. Two commercial buildings are located directly behind (northeast of) the facility. One of the buildings is currently vacant. The other building is occupied by Pharma Corp. Residential areas are located approximately 450 feet northeast of these two buildings. Residential areas are also located directly east and southeast of the facility, beyond which is a local high school. Directly south and across Detwiler Road are several commercial buildings with various tenants that include Lansdale Ice, Excel Communications Worldwide, Roy Lomas Carpets, and a land development company. Several of these buildings are vacant. Directly northwest of the facility, across Delp Drive, are Med Comp and Martech Medical Products, both medical device manufacturing facilities. A residence appears to be situated between these two facilities.

The facility consists of two buildings, the main building and the mill building (Appendix B: Figure 2 - Facility Layout Showing SWMU Locations). These buildings are accessible by card key access. The main building and parking areas were expanded from their original configuration in 2002. Presently, the main building is approximately 207,000 square feet and houses offices, manufacturing operations, and storage facilities for raw materials (e.g., pelletized polyetheretherketone [PEEK]). The facility's clean room manufacturing area is also located in the main building. Floor drains are located throughout the facility, including the shower and restroom areas. Dye trace testing previously conducted by the facility confirmed that the floor drains discharge into the Upper Gwynedd Towamencin Municipal Authority (UGTMA) sewer

system. According to the facility representative, any process waters that are placed into the floor drains have been determined either to be non-hazardous or have been managed to ensure compliance with the conditions of the facility's discharge permit with the UGTMA. No notices of violations have been received from the UGTMA. The former hazardous waste storage area was located on the northeastern corner of the main building was moved to the northwestern side of the building when the main building was expanded in 2002. The 14,000 square foot mill building was constructed in 1999. The mill room, pre-form department, and mechanical laboratory were moved to this building.

Approximately 15 acres (50%) of the 30 acre property is covered with impermeable surfaces. The remaining 15 acres consists of grass-covered surfaces, landscaped areas, and the facility's stormwater retention pond, which is located at the rear (northeast) end of the property. The stormwater pond was constructed in approximately 2002 and receives only stormwater runoff from the building roofs and the parking areas. Public water and sewer utilities are provided to the facility.

Soils, Geology, and Hydrogeology

The facility is situated within the Triassic Lowlands Section of the Piedmont Physiographic Province. The area has a dendritic drainage pattern. Regional topography consists of broad, shallow valleys and rolling hills; however, the facility property is relatively flat, sloping gently to the north-northwest.

According to the Preliminary Assessment (PA) prepared by NUS Corporation (NUS) in 1989, the majority of the facility is underlain by Reaville Series soil, which is a moderately deep, somewhat poorly drained, reddish shaly silt loam. This soil has slow permeability, moderate to low available water capacity, and is strongly to slightly acid. The northern and eastern fringes of the property are underlain by Abbottstown Series soil, which is a deep, somewhat poorly drained silt loam that formed in material weathered from red and brown shale and sandstone. This soil has low permeability, high moisture-holding capacity, and is very strongly to medium acid. According to the Final Report (in accordance with the Land Recycling and Environmental Remediation Standards Act [Act 2]) (Environmental Maintenance Company, Inc. [EMC], 2009), Klinesville Series soil is also present on the property. Klinesville Series soil consists of reddish-brown very shaly silt loam that has moderately rapid permeability and rapid surface runoff. Soil encountered during subsurface investigation activities conducted at the facility was described as

brown and reddish brown silt. Soil rich in organic matter was observed in the densely vegetated stormwater drainage swale located along Delp Drive.

Bedrock is reported to be shallow beneath the facility. Monitoring well boring logs for three shallow wells installed at the facility show that red weathered shale was encountered between five and six feet below ground surface (bgs), while competent red shale was encountered at approximately 10 feet bgs (EMC, 2009). The bedrock encountered beneath the facility is reportedly of the Brunswick Formation, which consists of very fine-grained reddish-brown shale, mudstone, and siltstone. The Brunswick Formation has moderate to low permeability, moderate secondary porosity due to moderately developed, vertical, blocky fractures, and is moderately resistant to weathering (EMC, 2009).

Groundwater in the weathered portion of the Brunswick Formation is typically under water table or semi-artesian conditions (NUS, 1989). Depths to groundwater measured in the shallow groundwater wells (15 to 20 feet deep) installed outside of the underground storage tank (UST) excavation at the facility suggest a southerly flow direction toward Detwiler Road. The shallowest depths to groundwater measured in these wells ranged from 3.68 feet bgs on the north side of the excavation to 9.59 feet bgs on the south side of the excavation. Depths to groundwater measured in the three bedrock wells located at the facility ranged from approximately 65 feet bgs on the southwest side of the facility to 70 feet bgs in a similarly constructed well on the northeast side of the facility. The depth to groundwater measured in a shallower bedrock well, located between these two wells, was 46 feet bgs.

Background Information

Farmland occupied the property prior to 1971. Greene, Tweed began constructing the facility in 1971 and finished in 1978. Since that time, Greene, Tweed has always been the sole owner and operator of the facility (NUS, 1989).

In 1989, the facility was listed as Greene Tweed Leasing following a corporate rearrangement. According to the Montgomery County Recorder of Deeds website (accessed April 20, 2011), the property is owned by Greene Tweed Leasing Corporation (a Greene, Tweed company) and Greene, Tweed & Co.

The facility is an active manufacturer of specialty seals, gaskets, and custom engineered plastic

components for the aerospace, defense, pharmaceutical, and chemical industries. The facility's main product lines currently include synthetic rubber, PEEK plastic, and plastics machining. The facility formerly produced raw urethane onsite. Small quantities of methylene chloride and xylene were used in the process to remove urethane polymer from finished products. The facility ceased production of raw urethane and the use of methylene chloride in the early 1990s. Urethane was replaced with PEEK which is currently purchased in pelletized form for use in the manufacturing operations. The facility also produced fabric rubber; however, this process was discontinued in the early 1990s.

Greene, Tweed is currently a large quantity generator (LQG) of hazardous waste (PAD980555197), maintains a State Only Operating Permit (SOOP) 46-0076 for air emissions, and has a National Pollutant Discharge Elimination System (NPDES) permit for stormwater (PAR230016).

The facility recently underwent a soil and groundwater investigation in accordance with Act 2 for a fuel oil release associated with two USTs. The Act 2 investigation specifically addressed the release of fuel oil from the two USTs which impacted two areas: the immediate area of the USTs and the drainage swale located in a grassy area of the facility directly northwest of the stormwater retention pond. PADEP approved the facility's Final Report and stated that the facility had demonstrated attainment of the residential Statewide Health Standard (SHS) for constituents of No. 2, 4, and 6 fuel oils for soil within the UST excavation and drainage swale, and for groundwater.

Four solid waste management units (SWMUs) were identified at the facility: SWMU 1 – Former Hazardous Waste Storage Area, SWMU 2 – Former Methylene Chloride Waste Drum Area, SWMU 3 – Current Hazardous Waste Storage Area, and SWMU 4 – Waste Hydraulic Oil/Coolant Storage Area (Appendix B: Figure 2 - Facility Layout Showing SWMU Locations). The SWMUs are discussed further in the *Description of all SWMUs and AOCs* section.

Another Greene, Tweed facility was located nearby in North Wales (322 Elm Avenue North Wales, Pennsylvania 19454) and operated under PAD077504795. By the 1970s, operations at that facility expanded and all Greene, Tweed operations and equipment eventually moved to the Kulpsville address. On May 18, 1992, Greene, Tweed notified PADEP that the North Wales facility was closed in July 1987 and hazardous waste activities had not been conducted at that site

since. The property was sold to Peter Lowenthal, Inc. in November 1987.

Waste Types and Quantities

According to the September 19, 1989 PA prepared by NUS, typical waste streams historically generated at the facility included Glydex (10% ammonia, 40% ethyl alcohol, 50% water), urethane, and laboratory waste streams. At the time of the PA, approximately 5,000 gallons of Glydex waste was generated annually. One drum of waste methylene chloride and xylene was generated per year from the urethane production process. One 55-gallon drum of laboratory waste (small quantities of toluene, methyl ethyl ketone [MEK], heptane, other solvents, and rubber) was generated per year in the research and development laboratories.

Currently, the facility generates Glydex and isopropanol that are managed as hazardous wastes. Waste methylene chloride and xylene generated during the urethane production process are no longer generated since this process was removed from the facility in the early 1990s. Glydex waste is stored in a 1,500-gallon aboveground storage tank (AST), (designated as AST 001A) situated in the current hazardous waste storage area located on the northwest side of the main building. A 1,500-gallon AST (AST 002A) containing virgin Glydex is situated adjacent to the waste AST. Drums of waste isopropanol are also stored in this containment area. The isopropanol waste is generated primarily in the clean room where it is typically sprayed onto towels used to clean equipment and products. Two drums of waste isopropanol were in the current hazardous waste storage area at the time of the 2011 site visit. According to the facility representative, Glydex waste comprises the majority of the hazardous wastes and has the potential to be flammable and corrosive.

The facility also generates non-hazardous waste hydraulic oil and coolant which is stored in 55-gallon drums in the waste hydraulic oil/coolant storage area located east of the current hazardous waste storage area (Appendix B: Figure 2 - Facility Layout Showing SWMU Locations).

Permit and Regulatory Action History

Waste

On August 15, 1980, the facility submitted a Notification of Hazardous Waste Activity to the

USEPA as a generator and treatment, storage, and disposal (TSD) facility. On August 18, 1980, the facility was assigned the temporary identification number PAT000621474. On November 17, 1980, the facility submitted a Part A Hazardous Waste Permit Application to the USEPA. On December 22, 1980, the USEPA acknowledged the submission, and on July 23, 1981, the USEPA completed the review process and granted the facility interim status. The permitted wastes included: D001 (ignitable), F001 (spent halogenated solvents in degreasing), F002 (spent halogenated solvents), and F011 (spent cyanide solutions from salt-bath pot cleaning from metal heat-treating operations). The process code listed was S01 (container storage).

On December 31, 1981, the facility was assigned the permanent USEPA ID No. PAD980555197. On February 25, 1983, PADEP requested a Part B permit from the facility.

A Notice of Violation (NOV) was issued on June 28, 1983, following a June 17, 1983 inspection, for a lack of Prevention, Preparedness, and Contingency (PPC) Plan as well as deficient accumulation dates on drum labels. On July 15, 1983, the facility notified PADEP that a PPC was developed and labels were corrected.

On July 15, 1983, the facility notified PADEP that they discontinued storage of hazardous waste for more than 90 days and requested to terminate interim status. On August 1, 1983, PADEP determined that the facility was not a TSD facility; thus, no Part B application was necessary.

On February 2, 1984, PADEP conducted an inspection noting the storage of three drums that exceeded 90 days and that the PPC plan was only partially drafted. A NOV followed on February 14, 1984. On March 13, 1984, the facility responded noting that the PPC plan would be revised and that the drums had been improperly labeled due to reusing drums that were previously labeled. On December 19, 1984, PADEP conducted an inspection and a NOV followed on December 31, 1984. It noted that wastes being shipped required more specific names to be listed on the manifest.

A compliance inspection was conducted on January 30, 1985 with no violations. On August 2, 1985, PADEP conducted an inspection and issued a NOV on August 6, 1985 for several drums that lacked adequate storage (appropriate secondary containment) and were improperly labeled. On August 16, 1985, the facility responded noting that all drums had been properly labeled and stored.

On June 3, 1987, PADEP conducted an inspection and noted that drums lacked labels and accumulation dates; a NOV followed on June 9, 1987. On June 16, 1987, the facility noted that the drums had been properly labeled.

A March 28, 1988 inspection noted that a methylene chloride accumulation drum was not labeled, annual updates for employee training programs were incomplete, and weekly inspections of hazardous waste storage containers were not documented. A NOV followed on March 30, 1988. On May 12, 1988, the facility responded noting that the violations were corrected.

On April 19, 1989, a joint inspection was conducted with PADEP, NUS, and USEPA. The PADEP inspection report noted that no land ban notifications were on file. No violations were noted. On September 19, 1989, NUS completed the PA of the facility for the USEPA resulting from the April 1989 inspection.

On March 26, 1992, an inspection was conducted by PADEP and a NOV followed on April 28, 1992. It noted a drum stored in excess of 90 days and seals in the hazardous waste accumulation area containment system needed repaired.

On October 4, 1993, an inspection was conducted by PADEP and confirmed that the facility was not a TSD.

A November 19, 2001 inspection by PADEP noted the facility generated D001 (ethanol/ammonium hydroxide mixture), D001 (isopropanol/methanol mixture), D001/D039 (waste petroleum naphtha), and various other lab-pack wastes. A manifest review indicated that the facility exceeded the small quantity generator (SQG) limits. Violations existed for the source reduction strategies (SRS) and errors in manifests.

A March 2, 2005 inspection by PADEP noted that the biennial waste report had not been submitted.

A February 28, 2006 inspection by PADEP noted no violations. A February 26, 2007 inspection by PADEP noted that residual waste reports required submission to PADEP and some manifests needed returned to the facility. On March 2, 2007, the facility responded noting violations were corrected.

On February 18, 2010, an inspection was conducted by PADEP noting no violations.

The facility submitted the residual waste report (Form 26Rs) from 2007 through 2010 for various waste streams including waste garnet from the water jet machine, ceramic wastes, waste oil, waste hydraulic oil absorbents, plant trash, carbon black, and polyvinyl chloride (PVC)/Teflon/chlorinated polyethylene (CPE)/other halogenated plastics.

Air

The PA noted that there were three air permits issued in the early 1980s by PADEP that were maintained at the facility (NUS, 1989):

- 46-302-070: boiler unit and rubber mill
- 46-319-009: air scrubber for the fluorimer reactor equipped with a heat exchanger
- 46-399-020: wear-ring department baghouse

Subsequent permit information indicates the permits were later incorporated into the facility operating permit 46-0076. This permit was issued in the 1980s for the boiler and reissued on October 24, 1991. Compliance inspections were on November 5, 1992, November 24, 1992, and November 14, 1995. This permit was later covered under 46-0076.

Permit No. 46-319-009

This permit was issued on May 29, 1980 for the fluorimer and reissued on November 1, 1983, November 9, 1987, November 15, 1991, and December 10, 1992. Compliance inspections included November 9, 1982, October 25, 1983, October 30, 1985, November 5, 1987, November 6, 1991, November 24, 1992, November 12, 1993, December 21, 1994, and November 14, 1995. This permit was later covered under 46-0076.

Permit No. 46-1071 Synthetic Minor

On May 17, 1996, the facility completed municipal notifications noting that it was applying for a Synthetic Minor Operating Permit (SMOP). On May 24, 1996, the facility submitted the application to PADEP for SMOP 46-1071. On June 11, 1996, PADEP acknowledged receipt of the application.

When this SMOP was issued on October 8, 1996, it was renumbered as 46-0076. It incorporated NOx emissions for Boilers No. 1, Boiler No. 2, an emergency generator, and three gas ovens.

Permit No. 46-0076 Synthetic Minor (later became Natural Minor)

A Request for Determination (RFD) (exemption permit) was issued on July 8, 1994 for the can spraying system and drying table. Another RFD was issued on December 29, 1995 for the exhaust fans.

An application of minor modification was sent on October 23, 2001 for SMOP 46-0076 as Boiler No. 2 was removed from service and replaced by Boiler No. 3. On December 7, 2001, PADEP conducted an inspection noting the boiler replacement. The boiler replacement required plan approval, not a minor modification; thus, on January 17, 2002 PADEP denied the application.

Application for permit renewal was submitted to PADEP on December 5, 2001 and May 29, 2002. On June 22, 2004, PADEP initiated its technical review of the application. On June 2, 2005, PADEP completed an internal technical review memo regarding the application and recommended permit issuance. On June 8, 2005, PADEP issued the permit as a Natural Minor SOOP.

On September 23, 2005, PADEP conducted a technical review for the administrative amendment noting changes from the June 2005 permit including removal and addition of various emission units. The revised permit was issued on October 27, 2005.

On September 15, 2008, the facility informed PADEP that they planned to install six electric ovens, which were exempt from plan approval.

On January 7, 2010, PADEP noted that they had received the renewal application on December 24, 2009.

Air Emission Reports

Available records indicate that the required annual air emission inventory reports were submitted for 1999 to 2010.

Air Fees

PADEP requested that the facility pay the required annual permit fees. Notifications were made on September 22, 1998, July 5, 2001, July 2, 2004, April 15, 2005, and June 25, 2010. The facility sent payments on November 24, 1993, December 9, 1996, October 28, 1999, August 14,

2000, July 2, 2002, July 16, 2004, May 2, 2005, April 4, 2006, April 5, 2007, April 7, 2008, April 17, 2009, and July 9, 2010.

NPDES Permits

Permit PA0012041

On August 4, 1971, the facility submitted an NPDES permit application to the United States Army Corps of Engineers (COE) for discharges of a combination of process cooling water, cleaning solution, rinse water, and boiler blowdown via one outfall (Outfall 001) to the tributary of Skippack Creek. According to a letter from PADEP to USEPA dated July 26, 1974, the draft permit (designated as USEPA permit PA0012041) was forwarded to PADEP for review. PADEP agreed with all permit conditions, and added that the facility must comply with the Pennsylvania Clean Streams Law and tie its wastes into the UGTMA sewer system no later than June 30, 1975. Permit PA0012041 was issued by USEPA on August 30, 1974.

On May 9, 1975, the facility notified USEPA that it had reached an agreement with UGTMA to discharge its industrial wastewater into the municipal sewer system. The letter stated that the necessary connections and alterations to divert the wastewater were made on April 3, 1975. At that time, only surface runoff from the roof drains were discharged to the storm sewer system. The facility requested permit PA0012041 be deleted.

Permit PA058688

The facility operated under NPDES permit PA058688 for industrial discharges into an unnamed tributary of Skippack Creek, which is classified for the following uses: trout stocking fishery, aquatic life, water supply, and recreation. Industrial discharges included under this permit consisted of boiler blowdown, air conditioner condensate, and variable stormwater flow.

On September 30, 2002, the facility notified Towamencin Township that it was applying for a NPDES permit to include the discharge of boiler blowdown and air conditioner condensate as well as stormwater to Skippack Creek. On December 12, 2002, the NPDES permit application and a PPC plan were submitted to and received by PADEP. (Note: The permit application stated that the facility was currently operating under a general permit [PA230016] for discharges of stormwater to the tributary of Skippack Creek via three outfalls [Outfalls 001, 002, and 003].) The application stated that boiler blowdown and air conditioner condensate would be discharged via Outfall 001. The facility provided PADEP with proof that notice of the application was made

to the local newspapers on January 7, 2003.

On March 18, 2003, PADEP denied the permit application for permit PA058688 for reasons that usage rates of two of the three chemical additives (Optisperse CPS 501 and Control IS, both boiler treatment chemicals) could potentially harm aquatic life and groundwater resources. The facility responded on July 8, 2003 and included calculations for the additives.

On October 8, 2003, PADEP provided the facility with a draft permit. On October 24, 2003, the facility responded with requested changes for weekly limits. PADEP approved the application for discharges via two outfalls (Outfalls 001 and 002) on November 26, 2003, and the final permit was issued on December 5, 2003. Issuance of permit PA058688 cancelled the facility's existing general permit PA230016.

On January 30, 2004, the facility notified PADEP that Optisperse would be eliminated as a boiler treatment chemical and replaced by BFW-35.

On July 26, 2004, PADEP notified the facility that USEPA was developing a Total Maximum Daily Load (TMDL) to address water quality impairments in the Skippack Creek watershed.

On January 3, 2008, PADEP conducted an inspection. The inspection report noted that floor drains inside of the manufacturing area were dye tested and determined to go to the UGTMA sewer system. In addition, the report noted that boiler blowdown was accumulated in two USTs located outside the north side of the building. The USTs reportedly stored less than 500 gallons. Overflow was piped directly to Outfall 001. PADEP issued a NOV on January 16, 2008 for not completing annual required sampling for 2007. The facility responded by stating the lack of annual sampling was a misunderstanding of the requirements. In addition, the facility stated that the boiler blowdown would be diverted to the UGTMA sewer system beginning February 18, 2008. (Note: The facility's letter was dated February 12, 2007.)

A follow-up inspection was conducted by PADEP on February 29, 2008 noting no violations. This inspection report confirmed that the facility had disconnected the boiler blowdown from Outfall 001 and diverted it to the UGTMA sewer system. Air conditioning condensate and stormwater would continue to be discharged via Outfall 001. The facility was in the process of amending the permit to reflect the change. On April 22, 2008, PADEP enclosed the Consent

Assessment of Civil Penalty (CACP) related to the January 16, 2008 NOV.

A discharge monitoring report (DMR) was submitted on July 3, 2008.

Permit PAR230016

On October 3, 2006, PADEP notified the facility that permit PAR230016 would soon expire. (Note: This permit was cancelled when permit PA058688 was issued.) On April 8, 2008, the facility submitted a permit renewal application for its NPDES permit that included discharges of stormwater from Outfalls 001, 002, and 003 and air conditioner condensate from Outfall 001. On July 1, 2008, PADEP approved the application and issued the permit under the original general permit PA230016, which expires on July 31, 2013.

B. Description of all SWMUs and/or Areas of Concern (AOCs)

SWMUs

Two SWMUs were identified at the facility as reported in the PA (NUS, 1989) (Appendix B: Figure 2 - Facility Layout Showing SWMU Locations): SWMU 1 – Former Hazardous Waste Storage Area and SWMU 2 – Former Methylene Chloride Waste Drum Area. SWMU 1 was closed in 2002 during building reconstruction; the storage of hazardous waste was moved to a new location and is identified as SWMU 3. SWMU 2 was removed in the early 1990s when the facility discontinued the use of methylene chloride.

SWMU 1 – Former Hazardous Waste Storage Area

This former SWMU, located outside the northeast corner of the main building, was used to store hazardous waste including Glydex, urethane, and laboratory wastes awaiting off-site disposal. Wastes were stored in 55-gallon drums or in a single 1,500 gallon AST (001A). The storage area was a 21 by 21 foot concrete pad with a six-inch high curb. The pad area was fenced with a six-foot high chain-link fence with wooden fencing on the northern and eastern faces. Operation began in 1978 and was active at the time of the 1989 PA. (Note: Information provided by the facility representative after the 2011 site visit stated SWMU 1 was constructed in 1983, and use began in 1984.) No known spills or releases occurred from this storage area at the time of the PA.

In 2002, the footprint of the main building was expanded to the north and the hazardous waste storage area was relocated to the northwest side of the main building (Appendix B: Figure 2 - Facility Layout Showing SWMU Locations). According to the facility representative, the hazardous waste storage area was demolished and the materials of construction were discarded. The facility representative was not certain that the storage area was properly closed in accordance with PADEP regulations. However, the facility provided documentation of soil sampling completed at SWMU 1 in 1992 at the request of PADEP, and documentation of integrity inspections completed on the two ASTs in 2002. Details of the 1992 investigation work are discussed in the *Investigations and Remedial Actions to Date* section. Documentation for the 2002 closure of the storage area could not be located by the facility; however the results of the AST integrity inspection indicated that no contamination was observed or suspected.

SWMU 2 – Former Methylene Chloride Waste Drum Area

Formerly, methylene chloride was used to clean the product supply hoses used in the urethane production process. The waste methylene chloride was collected into a 55-gallon drum located in the urethane production area. When the drum was full, it was relocated to the former hazardous waste storage area (SWMU 1) within 90 days. The date of commencement for this area was unknown. As of the early 1990s, urethane was no longer manufactured at the facility; therefore, usage of methylene chloride and the collection drum was discontinued. The facility replaced use of urethane with PEEK, which is purchased in pelletized form and stored in the main building. At the time of the PA, no spills or releases were reported and no evidence of releases was observed in this area (NUS, 1989). At the time of the 2011 site visit, there was no evidence of the methylene chloride waste drum in the former urethane production area.

Based on the records review and observations made during the 2011 site visit, two operational SWMUs, SWMU 3 - Current Hazardous Waste Storage Area and SWMU 4 - Waste Hydraulic Oil/Coolant Storage Area, were identified at the facility (Appendix B: Figure 2 - Facility Layout Showing SWMU Locations).

SWMU 3 – Current Hazardous Waste Storage Area

The current hazardous waste storage area is located on the northwest side of the main building. It consists of a 25 foot by 25 foot concrete pad with a six-inch high concrete curb on the northeast, northwest, and southeast sides. The cinderblock wall of the main building forms the southeast wall of the hazardous waste storage area. A two foot high concrete wall forms the southwest

side. The storage area is under a roof and surrounded on the three open sides by a six-foot high chain link fence, which is gated and locked. The floor, curbing and walls appeared to be epoxy coated and in good condition. A one foot by one foot concrete-lined sump is located in the south corner. Both the virgin isopropanol and waste Glydex ASTs are located within the storage area. The facility also uses this storage area to store virgin and waste flammable liquids (isopropanol). At the time of the site visit, two 55-gallon drums of waste isopropanol (one was stored in an over pack drum due to leakage) and numerous drums of virgin isopropanol were stored in this area.

SWMU 4 – Waste Hydraulic Oil/Coolant Storage Area

Waste hydraulic oil and coolant are stored in the covered, open-sided storage area located east of the current hazardous waste storage area (SWMU 3). These wastes are managed as residual wastes by the facility. The storage area consists of a 20 foot by 20 foot concrete pad that is surrounded on the northeast, northwest, and southwest sides by a six-foot high concrete curb. There is no curb on the southeast side of the storage area. The concrete outside the storage area has been recently patched (there are joints in the surface). The curb on the northwest and southwest sides is level with the grass surface. A small grass area is located directly outside of the northeast corner. The concrete pad is sloped toward the northwest corner. A small amount of precipitation was observed pooled in this corner. The storage area is surrounded by a six-foot high chain link fence that is gated and locked. The 55-gallon drums are stored directly on the concrete pad. At the time of the site visit, 23 drums of waste hydraulic oil and coolant were stored in this area. The majority of the drums were in good condition; however, at least one drum was significantly dented. There appeared to be no evidence of spills on the observable portions of the concrete pad, and the surrounding vegetation appeared healthy.

No AOCs were identified during the 2011 site visit.

Storage Tanks

Based on available documentation, four USTs and three ASTs were located at the facility as shown in the table below.

UNDERGROUND STORAGE TANKS				
Tank No.	**Installed**	**Size (gal)**	**Contents**	**Status**
001	1975	20,000	No. 2/6 Fuel Oil	Removed 2002
002	1972	15,000	No. 4 Fuel Oil	Removed 2002
NA	Unknown	< 300	Boiler Blowdown	Out-of-Service; Empty
NA	Unknown	< 300	Boiler Blowdown	Out-of-Service; Empty
ABOVEGROUND STORAGE TANKS				
Tank No.	**Installed**	**Size (gal)**	**Contents**	**Status**
001A	1982	1,500	Virgin Isopropanol	Active
002A	1982	1,500	Waste Glydex	Active
003A	1986	3,000	Liquid Nitrogen	Active

On November 3, 1989, PADEP confirmed receipt of the tank registration and fee for USTs 001 and 002 and ASTs 001A, 002A, and 003A. The USTs were removed in 2002. A discussion of the removal is provided in the *Investigations and Remedial Actions to Date* section. The facility continues to operate the ASTs, which are currently registered under facility identification 46-10487. ASTs 001A and 002A are located in the current hazardous waste storage area. AST integrity inspections completed on these two ASTs on October 24, 2002 show that the ASTs were in good condition with no observed or suspected contamination. (Note: These ASTs were situated in the former hazardous waste storage area (at the time of the integrity inspection [2002].) AST 003A is located approximately 125 feet southeast of the current hazardous waste storage area, immediately outside the backup room. During the 2011 site visit, a second liquid nitrogen AST (un-numbered) that is identical to Tank 003A was identified in a room within the mechanical lab. This AST is located between the main building and the mill building.

According to the facility representative, two USTs were formerly used to store boiler blowdown to discharge to Outfall 001. The USTs were used to allow the water too cool, as well as to stabilize the flow to the outfall. The USTs were less than 300 gallons and are located directly outside of the boiler room. The USTs remain in place, but are no longer used.

Investigations and Remedial Actions to Date

Leaking No. 6 Fuel Oil UST – 1983

According to the PA (NUS, 1989), the 20,000-gallon UST containing No. 6 fuel oil (UST 001) was discovered to have leaked. PADEP inspection reports dated May 20, 1983; May 25, 1983; May 26, 1983; May 27, 1983; June 8, 1983; July 11, 1983; September 1, 1983; and April 2, 1984 indicate that the facility notified PADEP of the release in May 1983. Oil-saturated soil was observed in the excavation during removal of the UST and approximately one inch of oil was observed on water entering the excavation. In addition, No. 6 fuel oil was observed in the drainage swale located behind the facility. It was believed that the oil was migrating along underground utility lines to the drainage swale. The facility installed oil/water separators. The contents were vacuum pumped regularly by J&J Spill Service.

PADEP required the facility to install six monitoring wells. Three of the wells were installed along the drainage swale behind the facility, two were installed upgradient to the UST excavation, and one was installed downgradient of the UST excavation. The wells were installed in June and July 1983. On September 27, 1983, the facility notified PADEP that 1,450 gallons of No. 6 fuel oil was recovered. No leaks were identified from the other UST (UST 002; 15,000 gallons containing No. 4 fuel oil). Sampling of the existing monitoring wells did not show any indication of oil contamination; however, the monitoring wells would continue to be sampled monthly for one year.

PADEP's inspection reports dated July 11, 1983; September 1, 1983; and April 2, 1984 state that all contaminated soil was removed and oil was not observed in any of the monitoring wells. The PA indicates that J&J Spill Service removed 110 cubic yards of contaminated soils and repaired the UST (NUS, 1989). The PA also states that soil samples were collected by PADEP before and after soil removal. Documentation of the soil and groundwater sample analytical results could not be located by the facility representative; however, the representative stated that facility personnel present during the cleanup activities stated the results were found to be satisfactory by PADEP (facility communication, 2011).

Former Hazardous Waste Storage Area Soil Sampling – 1992

In the March 26, 1992 PADEP inspection report, it was noted that two large cracks were observed running across the concrete pad of the former hazardous waste storage area (SWMU 1) and open

drain pipes were observed in the walls of the containment area. During the inspection, the inspector observed a sheen on rainwater that collected in the containment area. The rainwater was reportedly drained directly to the ground surface. The inspector noted that water was dripping from one of the plugged drain pipes directly onto the bare soil outside of the containment area. The report stated that the soils surrounding and downgradient of the storage area should be sampled and analyzed for any waste materials that had been stored.

According to an August 11, 1992 report prepared by Spotts, Stevens, and McCoy, Inc. (SSM) for the facility, four soil samples were collected in the drainage swale near the former hazardous waste storage area on July 16, 1992. The samples were designated as S-l, S-2, S-3, and S-4 (Appendix B: Figure 3 - SWMU 1 Soil Sample Locations). Sample S-1 was directly downgradient from the drain. Samples S-2 and S-3 were located 15 and 30 feet, respectively, east and downgradient from sample S-1. Sample S-4 was a background sample collected approximately 40 feet south and upgradient from sample S-1. The samples were collected at an approximate depth of one foot below ground surface (bgs) utilizing a bucket auger. Samples S-l, S-2, and S-3 were analyzed for ethanol (ethyl alcohol), toluene, MEK, and total petroleum hydrocarbons (TPH). In addition, sample S-1 was analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Sample S-4 was analyzed for TPH only. Analytical results indicated that none of the samples contained ethanol, toluene, or MEK at levels above laboratory detection limits. TPH concentrations varied from less than laboratory detection limits (S-2, S-3, and S-4) to 15.4 milligrams per kilogram (mg/kg) (S-1). Arsenic (0.84 mg/kg), barium (91.5 mg/kg), cadmium (0.95 mg/kg), chromium (16.2 mg/kg), lead (16.7 mg/kg), and selenium (0.143 mg/kg) were detected in sample S-1 below levels of environmental concern. The report concluded that the soil adjacent to the former hazardous waste storage area had not been adversely impacted by rainwater runoff from the concrete pad and no further action was required.

No. 6 Fuel Oil UST Release – February 2002

On February 8, 2002, PADEP received an incident notification for a large release impacting Skippack Creek (later determined to be 200 gallons of No. 6 fuel oil) following a refueling event at the facility. The leak reportedly originated from the 20,000 gallon UST containing No. 2 fuel oil (UST 001) and the 15,000 gallon UST containing No. 4 fuel oil (UST 002). (Note: Through its operational history, the facility varied heating oils stored in each UST. These are the same USTs that were the focus of the 1983 release.) The 200 gallons of released oil migrated across the asphalt parking lot, into a stormwater drainage pipe, and into a drainage swale located on the

north end of the facility. An estimated 50 gallons of oil impacted the property located at 1508-1510 Delp Drive. On March 13, 2002, the facility responded to the NOV issued by PADEP on February 27, 2002 giving detailed response efforts and action plans.

Drainage Swale Remediation

The initial cleanup of the impacted drainage swale consisted of the placement and maintenance of oil-absorbent booms and spill pads along the impacted area and waterways. The February 8, 2002 incident inspection notes indicated that the two USTs were immediately emptied and the facility hired Lewis Environmental Inc. to conduct emergency spill response. Following stabilization of the site, EMC was retained to continue the cleanup by clearing, excavating, and removing impacted material in the drainage swale to ensure that the drainage system would not continue to impact the neighboring property. Three tons of soils were removed from the grass-lined drainage swale using hand tools.

On February 12, 2002, PADEP confirmed that the drainage swale was not a wetland via a documented telephone conversation. Additional impacted soil was excavated from the drainage swale using a "long-stick" track excavator. Approximately 41 tons of impacted soils were excavated from the drainage swale. The depth of the impacted soil on the southwestern portion of the excavation extended to approximately 3.5 to four feet bgs, while the depth of the impacted soil in most other portions of the excavation extended to a maximum depth of two feet bgs. The horizontal extent of the excavation followed the general shape of the drainage swale, and the final dimensions of the excavation were approximately 200 feet long by two to 18 feet wide. The excavation extended to a maximum depth of approximately 4.5 feet below the former base of the area.

Additionally, the storm sewer outlet leading to the drainage swale was fitted with additional booms and a settlement basin to act as a temporary oil/water separator to collect any residual oil that could potentially discharge from the storm sewer outlet. As a final measure, a combination vacuum/jet truck equipped with a high-pressure pipe cleaning nozzle was used to power-wash out the interior of the storm sewer while collecting the wash water. All wash water from the cleaning event was captured and disposed of as potentially impacted water.

During excavation, impacted soil was stockpiled on plastic sheeting. A composite soil sample was collected from the excavated soil and submitted for analyses as required by Clean Earth. On

July 10, 2002, a total of 44.55 tons of impacted soil was transported to the Clean Earth facility. All drainage swale remedial activities were preformed in accordance with Act 2.

UST Removal and Associated Remediation - February 2002

PADEP conducted an inspection and on February 11, 2002 and sent the facility guidance to properly close the USTs and achieve compliance with the Clean Streams Law. The two USTs were removed between February 23 and 26, 2002. Impacted soil and free product were observed around the former UST locations. The impacted soil extended to weathered bedrock which was encountered at approximately five feet bgs within the excavation. Impacted material was removed from the excavation and properly disposed (Appendix B: Figure 4 - Well/Sump Locations).

Free product was observed on the surface of perched water within the excavation. To remove free product on the shallow groundwater surface within the excavation, several enhanced fluid recovery (EFR) pump outs of groundwater within the open excavation were conducted. A vacuum truck was used to skim free product and impacted groundwater from the top of the shallow groundwater surface. Between EFR events, oil-only absorbent booms and pads were placed in the excavation to recover any product entering the excavation. The EFR events and placement and maintenance of oil absorbent pads and booms were continued until no free product was observed and the sheen on the groundwater surface was eliminated. The UST tank remedial activities were preformed in accordance with Act 2.

Following the removal of impacted soil and free product from the groundwater surface within the excavation, post-excavation attainment soil samples were collected, and the facility initiated a groundwater investigation. The results of the soil and groundwater samples are discussed in the *Act 2 – 2009 Final Report* section.

Prior to backfilling the excavation and to allow for the monitoring and/or remediation of groundwater within the excavated area, two 15-inch diameter slotted sumps (Appendix B: Figure 4 - Well/Sump Locations) were installed in the excavation. The locations of the sumps were chosen based on the areas of anticipated product accumulation so that continued shallow groundwater remediation efforts would have the greatest impact. Following the installation of the sumps, several remedial purge events (RPEs) were conducted at both sumps as a continued groundwater remediation measure.

Notice of Intent to Remediate / Act 2 – April 2002

In accordance with Act 2, a Notice of Intent to Remediate (NIR) was submitted to the municipality on April 24, 2002 and to PADEP on May 1, 2002. The NIR was published in the newspaper on April 24, 2002. PADEP acknowledged receipt of the NIR on May 8, 2002.

On January 22, 2003, EMC provided PADEP with an update of the remediation activities completed at the facility, provided the results for groundwater samples collected from the sumps and three existing bedrock monitoring wells (discussed in the *Act 2- 2009 Final Report* section), and discussed the proposed groundwater sampling plan. On September 23, 2003, EMC requested a reduction of quarterly attainment sampling from eight to four quarters for the sumps, and that the bedrock monitoring wells be eliminated from the sampling program. PADEP indicated that additional shallow groundwater monitoring wells would be required outside of the excavation to establish groundwater flow characteristics and to evaluate whether constituents of concern (COCs) had migrated beyond the excavation area.

Monitoring Well Installation Work Plan – 2004

On February 18, 2004, EMC sent PADEP a work plan for the installation of additional shallow monitoring wells to demonstrate attainment under Act 2. On March 1, 2004, PADEP acknowledged the work plan. In February 2008, EMC installed three shallow monitoring wells (MW-1S, MW-2S, and MW-3S) adjacent to the former excavation (Appendix B: Figure 5 - Monitoring Well Locations). Each monitoring well was completed to the depth of the first water bearing zone (15 feet for MW-1S, and 20 feet for MW-2S and MW-3S) and screened across the water table with two-inch diameter slotted well screen.

Act 2 – 2009 Final Report

In January 2009, the facility sent the Final Report to PADEP. It concluded that all cleanup objectives were met, attainment of the residential SHS was demonstrated, and no exposure existed. A summary of the sample collection activities and analytical results are provided in the following paragraphs.

Soil Sampling and Analytical Results – 2009 Final Report: During the excavation activities, visual and olfactory examination and the sheen liberation test were continuously used to field screen soils. The extent of impacted soil was observed to decrease horizontally and vertically toward the completion of the excavation process in each area. Soil was excavated until impact to

the subsurface was not detectable by field methods (i.e. odor, photo ionization detector [PID], or sheen liberation test). A composite soil sample of the backfill materials was collected.

Twelve (12) post-excavation soil samples (SW-1 through SW-12) were collected within the UST excavation (Appendix B: Figure 6 - Post-Excavation Soil Sample Locations – Tank Area). The samples were collected from a depth of 4.5 to 5 feet bgs. Nine soil samples (G-1 through G-9) were collected along the drainage swale (Appendix B: Figure 7 - Post-Excavation Soil Sample Locations – Swale Area). The samples were collected from a depth of 0.5 to 1 foot bgs. The samples were analyzed for the PADEP Short List of Petroleum Products for No. 2, 4, and 6 fuel oils that included benzene, ethylbenzene, cumene, toluene, naphthalene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluorene, phenanthrene, and pyrene utilizing USEPA Methods5035/82608 and 8270C.

Laboratory analytical results for the post-excavation soil samples collected from the UST excavation indicated very low concentrations of the target analytes. Benzene, toluene, ethylbenzene, cumene, naphthalene, and anthracene were not detected above laboratory reporting limits in any of the 12 samples. Chrysene was detected in eight of the 12 samples ranging from non-detect to 0.064 mg/kg. Pyrene, benzo(a)fluoranthene, and benzo(a)pyrene were each detected in six of the 12 samples with maximum concentrations 0.185 mg/kg, 0.184 mg/kg, and 0.096 mg/kg, respectively. Fluorene, phenanthrene, and benzo(a)anthracene were detected in five of the 12 samples with maximum concentrations of 0.061 mg/kg, 0.160 mg/kg, and 0.106 mg/kg, respectively. Benzo(g,h,i)perylene was detected in three of the 12 samples with a maximum concentration of 0.042 mg/kg.

Laboratory analytical results for the soil samples collected from the drainage swale also indicated very low concentrations of the target analytes. Benzene, toluene, ethylbenzene, cumene, naphthalene, fluorene, chrysene, benzo(a)pyrene, benzo(g,h,i)perylene, and anthracene were not detected above laboratory detection limits in any of the nine samples. Pyrene was detected in four of the nine samples with a maximum concentration of 0.291 mg/kg. Phenanthrene was detected in two of the nine samples at concentrations of 0.068 mg/kg and 0.146 mg/kg. Benzo(a)anthracene and benzo(b)fluoranthene were each detected in one of the nine samples at concentrations of 0.091 mg/kg and 0.103 mg/kg, respectively.

Based on the analytical data, EMC stated that the soil attainment sampling was performed using the methods prescribed in the Act 2 Technical Guidance Manual, and the analytical results showed low concentrations of No. 2, 4, and 6 fuel oil target analytes, all below the applicable SHS medium specific concentrations (MSCs). Therefore, EMC concluded that attainment of the residential SHS for soils had been demonstrated.

Groundwater Sampling and Analytical Results - 2009 Final Report: Groundwater samples were collected from Sump 1 and Sump 2 installed within the excavation prior to backfilling during four events conducted between October 2002 and August 2003 (Appendix B: Figure 4 - Well/Sump Locations). The groundwater samples were analyzed for the PADEP Short List of Petroleum Products for No. 2 and No. 4 fuel oil. The analytical data indicated several of the COCs were present at concentrations below the applicable used aquifer residential MSCs. Specifically, concentrations of naphthalene (non-detect to 3 micrograms per liter [ug/L]), fluorene (non-detect to 0.5 ug/L), phenanthrene (non-detect to 0.7 ug/L), and pyrene (non-detect to 0.4 ug/L) were detected in both monitoring points during more than one sampling event, while concentrations of toluene (1 ug/L), anthracene (0.7 ug/L), and benzo(a)anthracene (0.1 ug/L) were only detected during one event and only in one of the two sumps. None of the target analytes were detected in the groundwater samples collected from the two sumps during the August 2003 sampling event.

Groundwater samples were also collected in October 2002 and January 2003 from three existing bedrock monitoring wells (MW-1, MW-2, and MW-3) that were located on the property. Monitoring wells MW-1 and MW-3 were 100 feet deep. Monitoring well MW-2 was 75.5 feet deep. The depths to groundwater measured in the wells in October 2002 were approximately 65 feet bgs (MW-1), 46 feet bgs (MW-2), and 70 feet bgs (MW-3). Low concentrations of chrysene (non-detect and 0.2 ug/L), naphthalene (non-detected and 1 ug/L), phenanthrene (0.2 ug/L and 0.1 ug/L), and pyrene (non-detect and 0.2 ug/L) were detected in the MW-1 sample. Low concentrations of phenanthrene were also detected in the MW-2 (0.2 ug/L and 0.2 ug/L) and MW-3 (non-detect and 0.2 ug/L) samples.

Four quarterly sampling events were completed at the three shallow monitoring wells from February 2008 to January 2009. The shallowest recorded depths to groundwater ranged from 3.68 feet bgs (MW-1S) to 9.59 feet bgs (MW-2S) in May 2008. Shallow groundwater flow was interpreted to be to the south toward Detwiler Road. None of the target analytes were detected

above laboratory detection limits in the groundwater samples, except naphthalene (3.1 ug/L) detected in the MW-1S sample during the January 2009 sampling event.

Vapor Intrusion Pathway Evaluation: Using the soil and groundwater analytical data, EMC evaluated the vapor intrusion pathway in accordance with the PADEP Act 2 vapor intrusion guidance (specifically, *Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard*). The report states that because the soil and groundwater data did not identify any target analytes at concentrations exceeding the indoor air quality (IAQ) screening thresholds, the IAQ exposure pathway was incomplete and no further evaluation of the vapor intrusion pathway was necessary.

Act 2 – 2009 Addendum to Final Report

On March 19, 2009, EMC submitted an Addendum to the Final Report to comply with PADEP's request for additional information. It included updated tables for the post-excavation samples including the depth of each sample, photos of the excavation, a figure depicting the area for which liability protection was requested, subsurface cross sections of the excavation, groundwater elevation data, and monitoring well boring logs.

On May 5, 2009, PADEP reviewed the addendum and noted the final report summary was attached describing the areas characterized and remediated. PADEP acknowledged that the facility had demonstrated attainment of the residential SHS for the constituents of No. 2, 4, and 6 fuel oils in both soil and groundwater related to the release at the former 20,000 gallon and 15,000 gallon USTs.

Inspections

Waste

Hazardous waste inspections have been routinely conducted at the facility from 1983 through the time of the 2011 site visit. Details regarding the observations made during the inspections are presented in the *Permit and Regulatory Action History* section.

Air

A December 8, 1993 inspection report noted that some equipment had stacks, but no control

equipment was present, including a secondary rubber mill, four ovens, press rooms, and injection molding machines. The permit did not cover the wood shop baghouse and cleaning tanks containing polyglycol.

On January 3, 1997, January 26, 1998, June 1, 1999, July 31, 2003, August 11, 2004, and June 28, 2005, PADEP conducted compliance air inspections with no violations.

A December 20, 2007 PADEP memo indicated that a newspaper article on December 18, 2007 described an evacuation of the facility on December 17, 2007, resulting from a fuming reaction when excess aluminum was added to a vat of acid. PADEP was not notified of the incident, which was a violation of a notification requirement in the facility's air permit. A NOV was issued on December 19, 2007. The facility responded on December 19, 2007, describing the incident. Five aluminum samples were dissolved in four gallons of 35% hydrochloric acid when vapors escaped beyond the hood. No malfunction of air emission equipment occurred and proper evacuation procedures were followed. PADEP conducted a follow-up inspection on January 15, 2008; no violations were noted.

Radiation

On October 20, 2009, PADEP conducted a radiation inspection for X-ray equipment; no items of noncompliance were observed.

C. Description of Exposure Pathways for all Releases or Potential Releases

Air: The facility is located in a mixed residential/commercial area of Kulpsville (a CDP), Pennsylvania. The CDP of Kulpsville had an estimated population of 8,005 in 2000, according to the United States Census Bureau (www.factfinder.census.gov, accessed April 26, 2011). The facility currently operates under a SOOP 46-0076 for air emissions associated with their manufacturing process. Emissions in excess of permit limits are not anticipated under normal operating scenarios.

Releases of No. 2, 4, and 6 fuel oil to soil and groundwater have been documented at the facility. The releases occurred within 100 feet of the main building or within 30 feet of an underground stormwater drain that terminates near the northeastern end of the main building. Post-excavation soil

samples collected from both the UST area and the drainage swale area indicate that low levels of fuel oil-related COCs remained in the soils. The soil samples were collected at depths of 4.5 to five feet bgs in the UST area and 0.5 to 1 foot bgs in the drainage swale. None of the fuel oil-related target analytes were detected in the groundwater samples with the exception of naphthalene detected in one well (3.1 ug/ L at MW-1S) during one sampling round in January 2009 (the depth to groundwater in MW-1S at this time was 5.66 feet bgs). Because low levels of fuel oil-related COCs remain in shallow soil near the facility buildings, the vapor intrusion pathway is a potential exposure pathway.

Groundwater: Groundwater in the weathered portion of the Brunswick Formation is typically under water table or semi-artesian conditions (NUS, 1989). Depths to groundwater measured in shallow groundwater wells (15 to 20 feet deep) installed outside of the UST excavation at the facility suggest a southerly flow direction toward Detwiler Road. The shallowest depths to groundwater measured in these wells ranged from 3.68 feet bgs on the north side of the excavation to 9.59 feet bgs on the south side of the excavation. Depths to groundwater measured in three bedrock wells located at the facility ranged from approximately 65 feet bgs on the southwest side of the facility to 70 feet bgs in a similarly constructed well on the northeast side of the facility. The depth to groundwater measured in a shallower bedrock well located between these two wells was 46 feet bgs. Groundwater samples collected from the shallow and bedrock monitoring wells showed that groundwater beneath the facility was not impacted with COCs specific to known releases (primarily constituents of No. 2, 4, and 6 fuel oils) that have occurred at the facility.

The facility and surrounding properties are supplied potable water by one of three public suppliers (NUS, 1989). The North Penn Water Authority (NPWA) utilizes 55 groundwater wells, 19 of which are located within a three-mile radius of the facility. The Hatfield Borough Water Authority (HBWA) utilizes nine groundwater wells, five of which are located within a three-mile radius of the facility. The North Wales Water Authority (NWWA) utilizes 28 groundwater wells, none of which are located within a three-mile radius of the facility. It is assumed that remainder of the population not connected to the public water supply relies on private wells.

Information obtained from the Pennsylvania Department of Conservation and Natural Resources (DCNR) Groundwater Information System (PaGWIS) accessed on January 20, 2011 indicates that 21 groundwater wells are located within a 0.5-mile radius of the facility.

- One well appears to be located on the facility property. The well is reportedly 400 feet

deep and is listed as a commercial withdrawal well. Other than the monitoring wells, there are no known wells located at the facility. The owner of the well is listed as Martech Medical Products who currently operates at 1500 Delp Drive, directly west of the facility.

- Six wells are listed as domestic use. These wells are located north and east of the facility and range in depth from 35 feet to 198 feet.
- Three wells are listed as industrial withdrawal wells. These wells are located west, south, and southeast of the facility and are 450 and 500 feet deep.
- Four wells are listed as unused. These wells range in depth from 470 to 670 feet deep. Two of the wells are located south of the facility across Detwiler Road and are owned by the United States Geological Survey. These wells are listed as test wells. One of the unused wells is located northwest of the facility and is owned by North Penn Water Authority.
- Four wells are listed as mine use. These wells are located south of the facility across Detwiler Road and range in depth from 90 to 100 feet.
- Three of the wells are listed as public supply wells. Two are owned by the local high school located approximately 0.45 miles southeast of the facility at the intersection of Detwiler Road and Route 63. These wells are 101 and 130 feet deep, and area listed in the PADEP Public Drinking Water Information System as inactive. The other well is owned by NPWA. The well is 630 feet deep and is located approximately 0.45 miles north of the facility.

Due to the fact that groundwater is not directly used at the facility; the facility and surrounding areas are provided public water from groundwater wells located outside of a three-mile radius of the facility (with the exception of the NPWA well located north of the facility); groundwater at the facility has been shown not to be contaminated with COCs specific to documented releases that occurred at the facility, it is concluded that the groundwater exposure pathway is not of concern for this facility at this time.

Surface Water: The facility is situated within the Triassic Lowlands Section of the Piedmont Physiographic Province. The surrounding area has a dendritic drainage pattern, and topography consists of broad, shallow valleys and rolling hills. The facility property is relatively flat, but slopes gently to the north-northwest. In 2002, the facility constructed a stormwater retention

pond on the northeastern property boundary. The pond receives only runoff from the building roofs and the parking areas. The facility maintains a NPDES permit for discharges of stormwater via three outfalls. One of the outfalls (Outfall 001) is located in the heavily vegetated drainage swale directly north of the pond. The outfall receives only stormwater runoff and overflow from the pond, as well as air conditioner condensate. The drainage swale discharges to an unnamed, intermittent stream located approximately 700 feet northeast of the facility, which in turn discharges to an unnamed tributary to Skippack Creek located approximately 0.3 miles northwest of the facility. Another intermittent stream was identified in the PA (NUS, 1989) on the southern side of Detwiler Road. This stream eventually flows to the west where it converges with Skippack Creek approximately one mile southwest of the facility. It is not expected that stormwater runoff from the facility would enter this intermittent stream.

The facility's current hazardous waste storage area and waste hydraulic oil/coolant storage area are contained under roof, on curbed, concrete pads. A self-contained concrete-lined sump is located within the hazardous waste storage area. There are no stormwater catch basins located directly adjacent to either of these containment areas that would discharge directly to nearby surface water bodies.

Information obtained from PADEP eMapPA (accessed January 20, 2011) indicates that the facility is located near a TMDL Watershed (for Skippack Creek). There is trout stocking in Skippack Creek; however, it is not considered a cold or warm water fishery. There are no designated scenic rivers, nor any impaired waters. No wetlands were identified in the vicinity of the facility during the 1989 PA, and according to the Final Report (EMC, 2009), the stormwater retention pond and drainage swale are not considered wetlands. Based on this information, it is concluded that direct discharges of surface runoff to nearby surface water bodies is not an exposure pathway for this facility at this time.

As previously discussed, groundwater investigations completed at the facility suggest that shallow groundwater flows to the south toward Detwiler Road. Deeper groundwater appears to flow to the north beneath the northeastern portion of the property and to the south beneath the southwestern portion of the property. Analytical data for groundwater samples collected from the facility's shallow and bedrock monitoring wells have shown that groundwater is not impacted by constituents related to documented releases (specifically No. 2, 4, and 6 fuel oils). In addition, there have been no reported releases to groundwater and no evidence of releases was observed at

the facility's current and former regulated storage units or the unregulated storage unit. Therefore, it is concluded the direct discharges of contaminated groundwater to nearby surface water bodies is not an exposure pathway for this facility at this time.

Soil: The majority of the facility is underlain by a Reaville Series soil, which is a moderately deep, somewhat poorly drained, reddish shaly silt loam. These soils have a slow permeability, moderate to low available water capacity, and are strongly acid to slightly acid. The northern and eastern fringes of the property are underlain by Abbottstown Series soils, which are deep, somewhat poorly drained silt loams that formed in material weathered from red and brown shale and sandstone. This soil has slow permeability, has high moisture-holding capacity, and is very strongly acid to medium acid. According to the Final Report (EMC, 2009), Klinesville Series soils are also present on the property. Klinesville Series soils consist of reddish-brown very shaly silt loam that has a moderately rapid permeability and rapid surface runoff. Soils encountered during subsurface investigation activities conducted at the facility consisted of brown and reddish brown silt. Soils rich in organic matter were observed in the densely vegetated stormwater drainage swale located along Delp Drive.

Approximately 15 acres (50%) of the 30 acre property is covered with impermeable surfaces. The remaining 15 acres consists of grass-covered surfaces, landscaped areas, and the facility's stormwater retention pond, which is located at the rear (northeast) end of the property. Areas where contaminated soil was identified (and subsequently remediated) are either asphalt-paved or beneath building foundations. One area, the drainage swale located near the northeastern property boundary, is heavily vegetated. Contaminated soil was removed from the drainage swale in 2002 (EMC, 2009). The current hazardous waste storage areas and waste hydraulic oil/coolant storage area are situated on curbed, concrete pads. While grassy areas are located outside of these storage areas, it is believed that any releases would be contained within the containment areas. Therefore, based on this information, it is concluded that exposure to contaminated soil is not an exposure pathway at this time.

D. Exposure Pathway Controls and/or Release Controls Instituted at the Facility

Air: The facility operates under a SOOP for its emissions sources. With the exception of a failure to report an incident that occurred in 2007, there have been no violations of the facility's air permit

since 1997, according to available documentation. Therefore, it is concluded that no additional controls are required for air for this facility at this time.

USEPA has requested that the vapor intrusion pathway be evaluated as part of the EI process. The USEPA 2002 OSWER *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* provides a methodology for vapor intrusion evaluation under current land use conditions using available site data. It should be noted that the USEPA 2002 guidance is not generally recommended for use in evaluating settings that are primarily occupational. However, the PADEP Act 2 vapor intrusion guidance (specifically, *Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard*) can be applied to both residential and nonresidential receptors. This guidance provides decision matrices for soil and groundwater (under a Statewide health or generic approach) for determining if indoor air quality is a concern. Therefore, the PADEP vapor intrusion guidance was used, as appropriate, to evaluate a potential vapor intrusion pathway in this EI Report.

As previously discussed, EMC evaluated the vapor intrusion pathway in accordance with the PADEP Act 2 vapor intrusion guidance as part of the Act 2 Final Report. EMC concluded that because the soil and groundwater data did not identify any of the target analytes at concentrations exceeding the IAQ screening thresholds, the IAQ exposure pathway was incomplete and no further evaluation of the vapor intrusion pathway was necessary. The PADEP vapor intrusion guidance allows screening of available soil and groundwater data against these thresholds provided that at least five feet of soil-like material (not sand or sand-like material) separates the source from the receptor. Based on the information provided in the Act 2 Final Report, the UST post-excavation soil samples were collected from a depth of 4.5 to 5 feet bgs, and the drainage swale soil samples were collected from a depth of 0.5 to 1 foot bgs. The soil in the UST excavation consisted of silty clay to five feet bgs followed by weathered shale in the UST area. The soils in the drainage swale were reportedly organic rich (EMC, 2009). EMC's Final Report did not provide a detailed analysis of the evaluation of the vapor intrusion pathway; therefore, the soil and groundwater data were used to re-evaluate the vapor intrusion pathway for this EI report.

Benzene, toluene, ethylbenzene, cumene, naphthalene, and anthracene were not detected above laboratory detection limits in the UST post-excavation samples. These COCs along with fluorene, chrysene, benzo(a)pyrene, and benzo(g,h,i)perylene were not detected above laboratory

detection limits in the drainage swale soil samples. The maximum concentrations of COCs that were detected in the UST post-excavation samples were: benzo(a)anthracene (0.106 mg/kg), benzo(a)pyrene (0.096 mg/kg), benzo(b)fluoranthene (0.184 mg/kg), benzo(g,h,i)perylene (0.042 mg/kg), chrysene (0.064 mg/kg), fluorene (0.061 mg/kg), phenanthrene (0.160 mg/kg), and pyrene (0.185 mg/kg). The maximum concentrations of the COCs that were detected in the drainage swale post-excavation samples were: benzo(a)anthracene (0.091 mg/kg), benzo(b)fluoranthene (0.103 mg/kg), phenanthrene (0.146 mg/kg), and pyrene (0.291 mg/kg). Of these COCs, fluorene is the only COC listed in the PADEP guidance that would require further evaluation; however, this COC is listed as a constituent not of concern for volatilization to indoor air in an industrial setting.

Groundwater samples for shallow monitoring wells installed outside of the UST excavations showed that fuel oil-related target analytes were not present in groundwater, except naphthalene detected at 3.1 ug/L in the MW-1S sample analyzed in January 2009 (depth to water was 5.66 feet bgs). Naphthalene is also listed as a constituent not of concern for volatilization to indoor air in an industrial setting. Based in this information, it is concluded that no controls are required for the vapor intrusion pathway at this facility at this time.

Groundwater: The facility's operations are conducted indoors. All floor drains inside of the facility buildings have been dye traced and shown to discharge directly to the UGTWA municipal sewer system. These discharges are permitted under a permit issued by UGTWA. Hazardous wastes are stored outdoors within a covered, open-sided building. The wastes are stored in 55-gallon drums and one 1,500 gallon AST that are situated on a curbed concrete pad, with a concrete-lined sump. The virgin isopropanol AST is also stored in this area. Non-hazardous waste hydraulic oils/coolants are stored in 55-gallon drums in the waste hydraulic oil/coolant storage area. There have been no releases reported and no evidence of releases was observed at the former and current hazardous waste storage areas or at the waste hydraulic oil/coolant storage area.

There have been two reported of releases from the former No. 2/No. 4/No. 6 fuel oil USTs. The first occurred in 1983. Contaminated groundwater and residual oil was vacuum-extracted from the UST excavation area and subsequent monitoring of six wells installed under the direction of PADEP showed that contaminated groundwater had been successfully remediated. The USTs were repaired and placed back into service. In 2002, approximately 200 gallons of fuel oil was released while filling these USTs, impacting soils in the area of the UST and in a drainage swale located

downgradient of the USTs at the facility's northeastern property boundary (business located at the end of Delp Drive). The USTs were permanently removed and subsequent groundwater remediation and monitoring was conducted in accordance with PADEP Act 2 program guidance. At this time, three shallow groundwater wells were installed outside of the excavation. The analytical results for two quarterly samples from the bedrock monitoring wells and four quarterly samples from the shallow monitoring wells showed that none of the targeted analytes (specifically No. 2, 4, and 6 fuel oil parameters) were detected above laboratory detection limits, except naphthalene, which was detected in one sample at 3 ug/L, below the used aquifer residential MSC of 100 ug/L. The Final Report was submitted to PADEP. PADEP acknowledged that the facility had demonstrated attainment of the residential SHS for groundwater on May 5, 2009.

Because there have been no reported releases to groundwater associated with the regulated and unregulated storage units, and it has been shown that shallow and deeper groundwater is not impacted by the known releases that have occurred at the facility, it is concluded that no controls are relevant for groundwater at this facility.

Surface Water: As previously discussed, the fuel oil release that occurred in 2002 impacted the drainage swale to the intermittent stream located northeast of the facility. The release did not impact the stream and the contaminated soil was removed from the drainage swale. In addition, PADEP confirmed that the drainage swale was not a wetland.

The facility's operations are conducted indoors and any process water is discharged directly to the UGTWA sewer system. The current hazardous waste storage area and the waste hydraulic oil/coolant storage area are contained, and there are no stormwater catch basins located adjacent to these units. Both shallow and deeper groundwater has been shown not to be contaminated related to the documented releases that have occurred at the facility, and there have been no documented releases from the regulated and unregulated storage units. Therefore, it is concluded that no controls are relevant for discharges to surface water at this facility.

Soil/Sediment: There have been two documented releases from the facility's former fuel oil USTs that have impacted soil. The first incident occurred in 1983 when the one of the USTs was found to be leaking. The facility excavated the contaminated soil and free product, and remediated contaminated groundwater/free product using a vacuum truck. PADEP was onsite to monitor the

clean up progress. The PA (NUS, 1989) noted that soil samples were collected before and after the removal of the impacted soil; however, no results of the sampling were available for this report.

The second release occurred in 2002 which impacted subsurface soil in the area of the USTs as well as surface soil in the drainage swale at the discharge point for Outfall 001 (northeastern property boundary). The two associated USTs were removed, the impacted areas were investigated, and the impacted soils were removed. A total of 44.55 tons of impacted soil was removed from the drainage swale and impacted soil in the UST area was excavated to approximately five feet bgs where weathered bedrock was encountered.

Post-excavation soil sampling was conducted at both the UST excavation area and the drainage swale in accordance with the PADEP Act 2 guidance. The soil samples were analyzed for the PADEP Short List of Petroleum Products for No. 2, 4, and 6 fuel oils that included benzene, ethylbenzene, cumene, toluene, naphthalene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluorene, phenanthrene, and pyrene. The maximum concentrations of the detected COCs in the UST post-excavation samples (collected from a depth of 4.5 to 5 feet bgs due to the presence of groundwater in the bottom of the excavation) were: benzo(a)anthracene (0.106 mg/kg), benzo(a)pyrene (0.096 mg/kg), benzo(b)fluoranthene (0.184 mg/kg), benzo(g,h,i)perylene (0.042 mg/kg), chrysene (0.064 mg/kg), fluorene (0.061 mg/kg), phenanthrene (0.160 mg/kg), and pyrene (0.185 mg/kg). The maximum concentrations of the detected COCs in the drainage swale post-excavation samples (collected from a depth of 0.5 to 1 foot bgs) were: benzo(a)anthracene (0.091 mg/kg), benzo(b)fluoranthene (0.103 mg/kg), phenanthrene (0.146 mg/kg), and pyrene (0.291 mg/kg). According to the Final Report (EMC, 2009), the results of the attainment sampling for soil indicated that concentrations of fuel oil-related target analytes were below the applicable PADEP direct contact and used aquifer soil to groundwater residential MSC; therefore attainment of the residential SHS was demonstrated. PADEP approved the Final Report on May 5, 2009. Currently, the former UST area is asphalt-covered, and the drainage swale is heavily vegetated.

In 1992, PADEP requested the facility conduct surface soil sampling in a drainage swale located directly northeast of the former hazardous waste storage area. Three soil samples were collected from a depth of 0.5 feet bgs along the drainage swale. The three samples were analyzed for the constituents of the wastes stored there (ethyl alcohol, toluene, and MEK), as well as TPH. Ethyl alcohol, toluene, and MEK were not detected in the samples. TPH (15 mg/kg) was detected in

the sample collected adjacent to the containment area, but not in the other two samples. This sample was also analyzed for the eight RCRA metals. Low concentrations of arsenic (0.84 mg/kg), barium (91.5 mg/kg), cadmium (0.95 mg/kg), chromium (16.2 mg/kg), lead (16.7 mg/kg), and selenium (0.143 mg/kg) were detected in the sample. In 2002, the former hazardous waste storage area was demolished and moved to the northwestern side of the facility. There is no documentation that the area was properly closed at that time. However, no known releases have occurred at this location. The main building was expanded over this location.

Based on the information discussed above, contaminated soil associated with documented releases has been removed. The former UST area is asphalt-covered and the former hazardous waste storage area is currently covered by the foundation of the main building. In addition, there have been no known releases to soil at the current hazardous waste storage area or the waste hydraulic oil/coolant storage area, and no evidence of releases has been observed. Therefore, it is concluded that no controls are relevant for soil at this facility at this time.

E. Follow-up Action Items

USEPA Region III will decide if additional information or sampling at the facility is required to determine whether or not the environmental indicators have been met or if corrective action is required for the facility.

APPENDIX A

Photographs

MICHAEL BAKER JR., INC. – PHOTOGRAPHIC RECORD

SITE NAME: Greene, Tweed & Co.

PHOTOGRAPH **1**	
VIEW **Interior**	
PHOTOGRAPHS BY **Baker**	

Comments: Former Location of SWMU 1 **–** Hazardous Waste Storage Area.

PHOTOGRAPH **2**	
VIEW **Northeast**	
PHOTOGRAPHS BY **Baker**	

Comments: SWMU 1 - Hazardous Waste Storage Area: Locked/Gated Entrance.

MICHAEL BAKER JR., INC. – PHOTOGRAPHIC RECORD

SITE NAME: Greene, Tweed & Co.

PHOTOGRAPH **3**	
VIEW **South**	
PHOTOGRAPHS BY **Baker**	

Comments: SWMU 1 – Hazardous Waste Storage Area: Waste Glydex AST.

PHOTOGRAPH **4**	
VIEW **Southeast**	
PHOTOGRAPHS BY **Baker**	

Comments: SWMU 1 – Hazardous Waste Storage Area: Virgin Isopropanol AST.

MICHAEL BAKER JR., INC. – PHOTOGRAPHIC RECORD

SITE NAME: Greene, Tweed & Co.

PHOTOGRAPH **5**	
VIEW **North**	
PHOTOGRAPHS BY **Baker**	

Comments: SWMU 1 – Hazardous Waste Storage Area: Drummed Virgin/Waste Isopropanol Storage.

PHOTOGRAPH **6**	
VIEW **Southeast**	
PHOTOGRAPHS BY **Baker**	

Comments: SWMU 1 – Hazardous Waste Storage Area: Self-contained Concrete-lined Sump.

MICHAEL BAKER JR., INC. – PHOTOGRAPHIC RECORD

SITE NAME: Greene, Tweed & Co., Inc.

PHOTOGRAPH **7**	
VIEW **Interior**	
PHOTOGRAPHS BY **Baker**	

Comments: Former location of SWMU 2 – Methylene Chloride Waste Drum in the Former Urethane Production Area.

PHOTOGRAPH **8**	
VIEW **Northwest**	
PHOTOGRAPHS BY **Baker**	

Comments: AOC 1 – Waste Hydraulic Oil/Coolant Storage Area.

MICHAEL BAKER JR., INC. – PHOTOGRAPHIC RECORD

SITE NAME: Greene, Tweed & Co.

PHOTOGRAPH **9**	
VIEW **Southwest**	
PHOTOGRAPHS BY **Baker**	

Comments: AOC 1 – Waste Hydraulic Oil/Coolant Storage Area.

PHOTOGRAPH **10**	
VIEW **Northeast**	
PHOTOGRAPHS BY **Baker**	

Comments: Location of 1983 Leaking No. 6 Fuel Oil UST and 2002 Act 2 No. 6 Fuel Oil Release – Tank Area.

MICHAEL BAKER JR., INC. – PHOTOGRAPHIC RECORD

SITE NAME: Greene, Tweed & Co.

PHOTOGRAPH **11**	
VIEW **Southwest**	
PHOTOGRAPHS BY **Baker**	

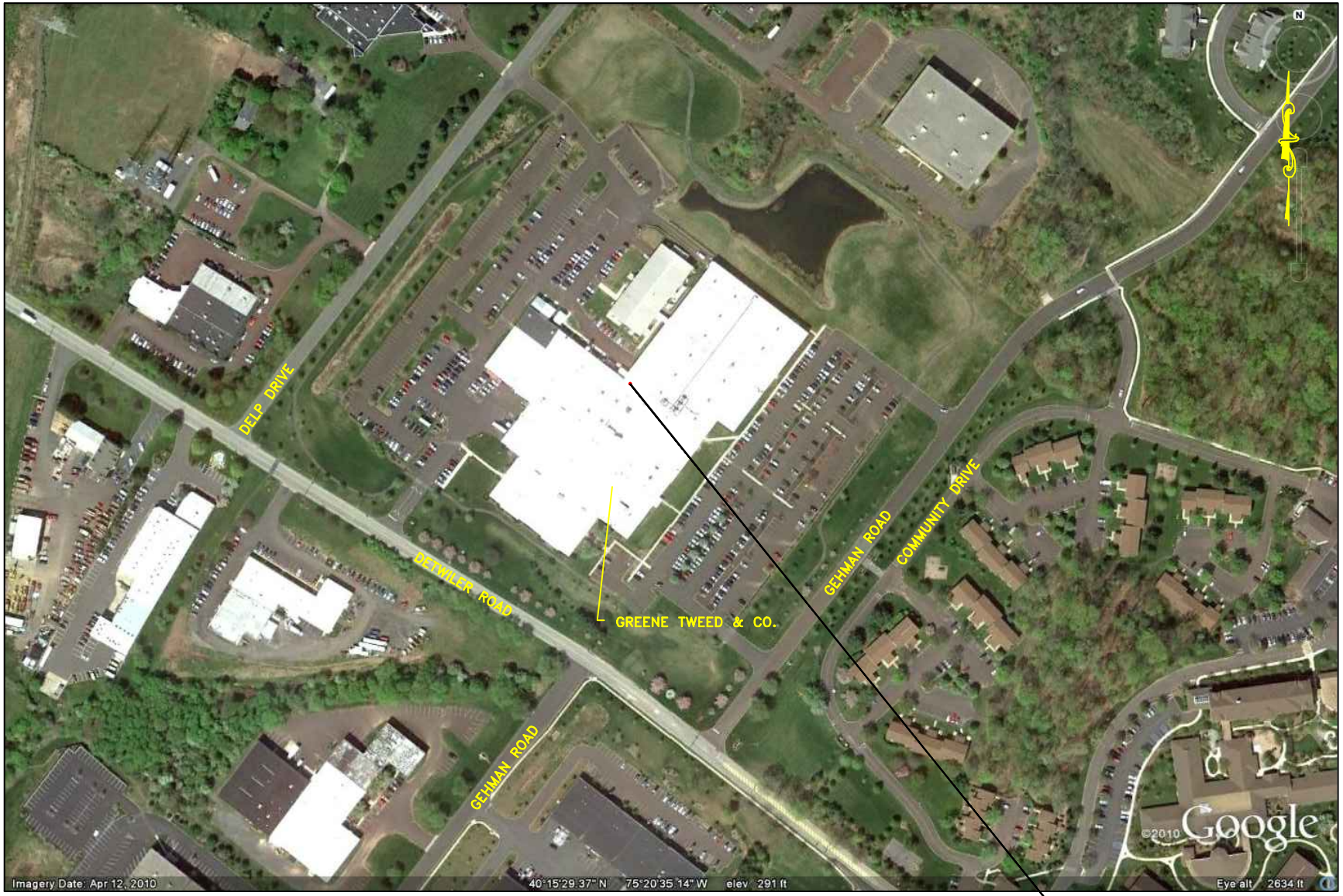
Comments: Location of 1983 Leaking No. 6 Fuel Oil UST and 2002 Act 2 No. 6 Fuel Oil Release – Tank Area.

PHOTOGRAPH **12**	
VIEW **Northeast**	
PHOTOGRAPHS BY **Baker**	

Comments: Location of 2002 Act 2 No. 6 Fuel Oil Release – Drainage Swale Area.

APPENDIX B

Figures



LAT=40° 15'30.64"N
LON=75° 20'36.27"W

300 0 150 300
1 inch = 300 ft.

Source: Google maps

SCALE: 1" = 300'	DATE: JANUARY 2012
S.O. NO.: 120678 2070	FILE: 120678-GTC-01
DSN/DWN: MM/WJH	CHK: MM

Baker MICHAEL BAKER JR., INC.
MOON TOWNSHIP, PENNSYLVANIA

FIGURE 1
FACILITY LOCATION MAP
GREENE, TWEED & CO.
KULPSVILLE, PENNSYLVANIA

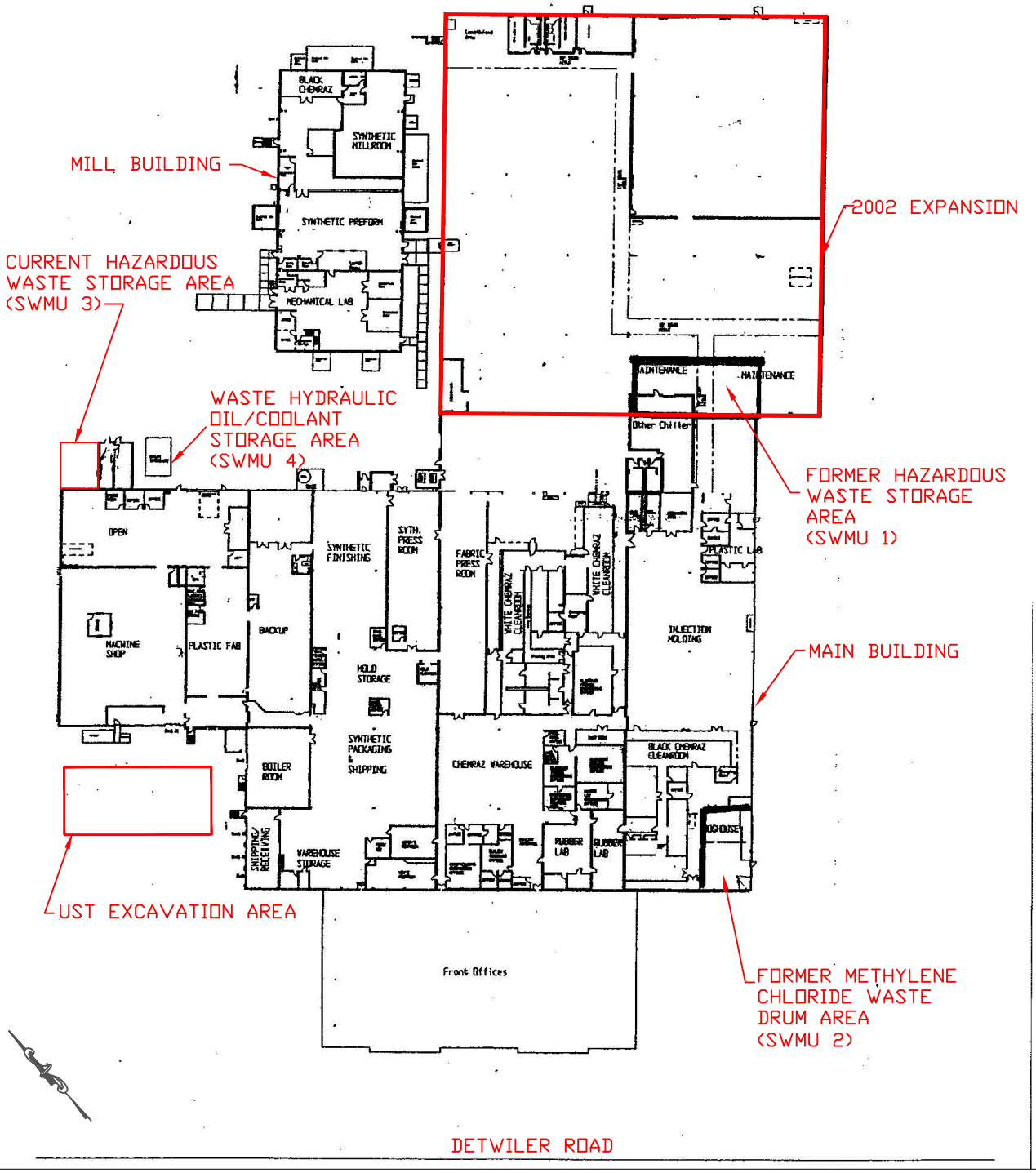


FIGURE 2
FACILITY LAYOUT SHOWING SWMU LOCATIONS
GREENE, TWEED & CO.
KULPSVILLE, PENNSYLVANIA

NOTES:
1. SWMU AND AOC LOCATIONS BASED ON SITE VISIT, INTERVIEWS AND AVAILABLE INFORMATION
2. LABELS IN RED ADDED BY BAKER

SOURCE: GREEN, TWEED & CO.

SCALE: NOT TO SCALE	DATE: JANUARY 2012
S.O. NO.: 120678	FILE: 120678-GTC-07
DSN/DWN: JBM/RRR	CHK: SRF

Baker MICHAEL BAKER JR., INC.
MOON TOWNSHIP, PENNSYLVANIA

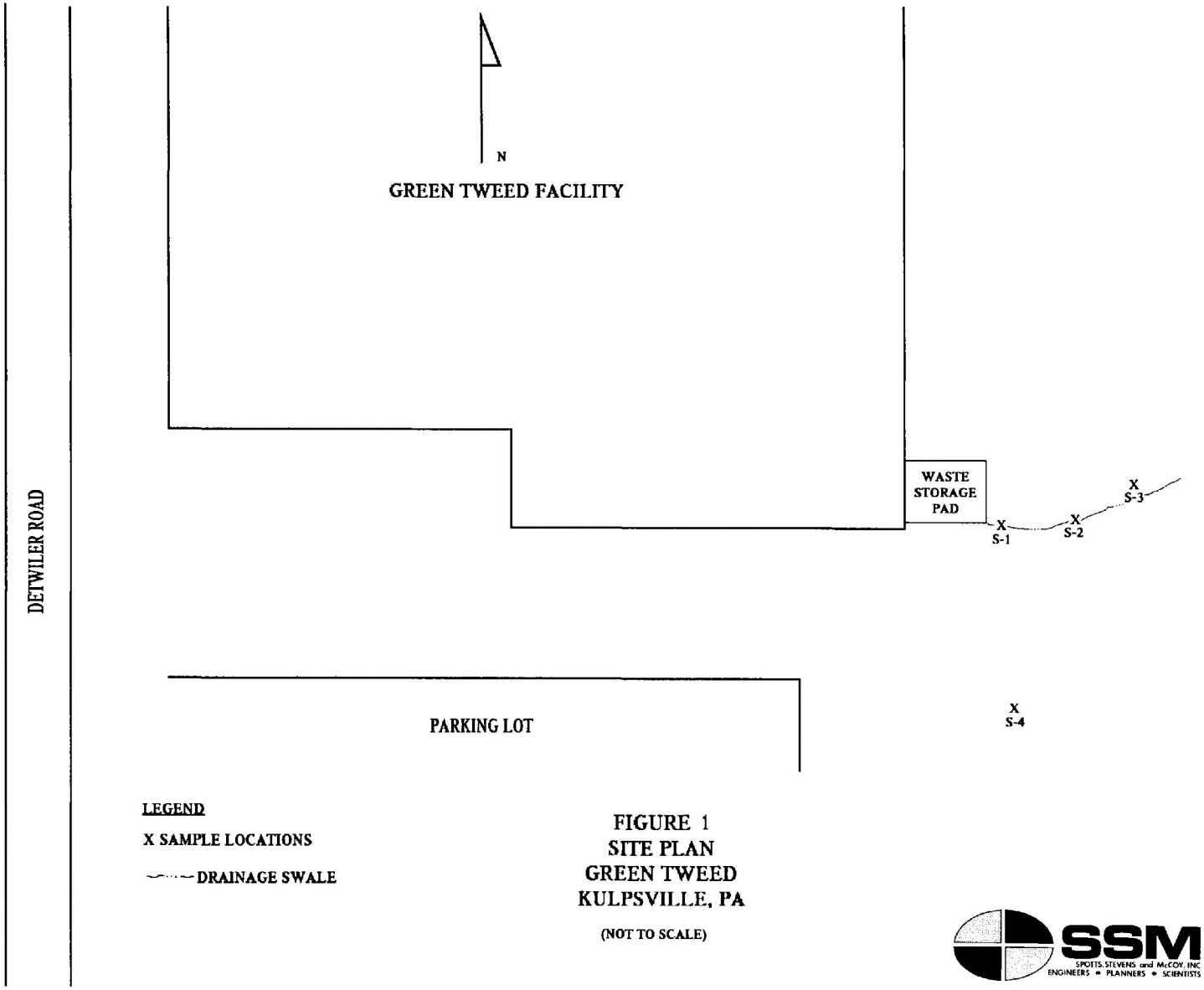
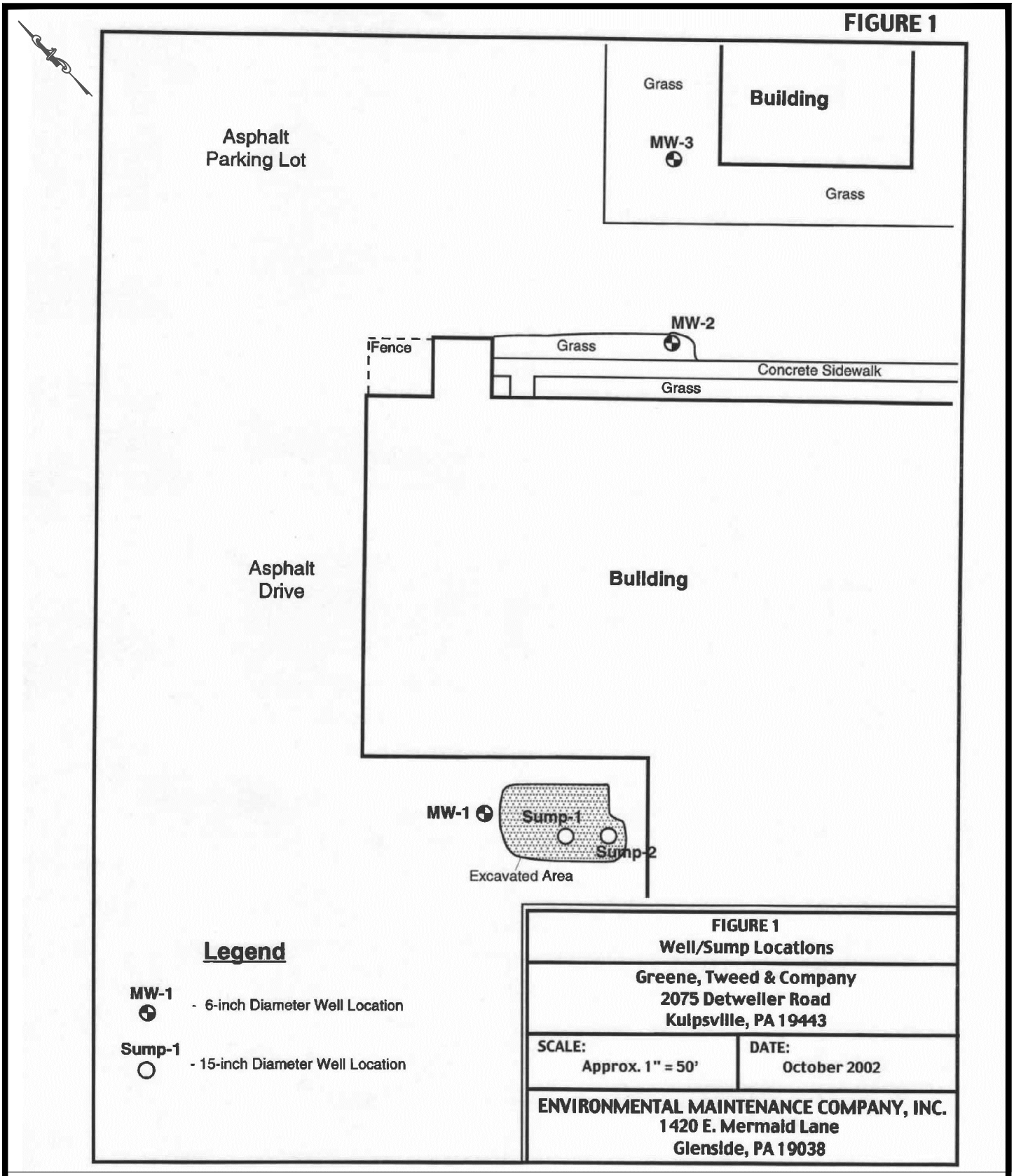


FIGURE 1
SITE PLAN
GREEN TWEED
KULPSVILLE, PA
(NOT TO SCALE)

SSM
SPOTTS, STEVENS and McCOY, INC
ENGINEERS • PLANNERS • SCIENTISTS

Source: SOIL SAMPLING LETTER REPORT; STEVENS, SPOTTS, AND MCCOY, INC.; AUGUST 12, 1992.

SCALE: NOT TO SCALE	DATE: JANUARY 2012	Baker MICHAEL BAKER JR., INC. MOON TOWNSHIP, PENNSYLVANIA
S.O. NO.: 120678	FILE: 120678-GTC-09	FIGURE 3 SWMU 1 SOIL SAMPLE LOCATIONS GREENE, TWEED & CO. KULPSVILLE, PENNSYLVANIA
DSN/DWN: TME/TME	CHK: TME	



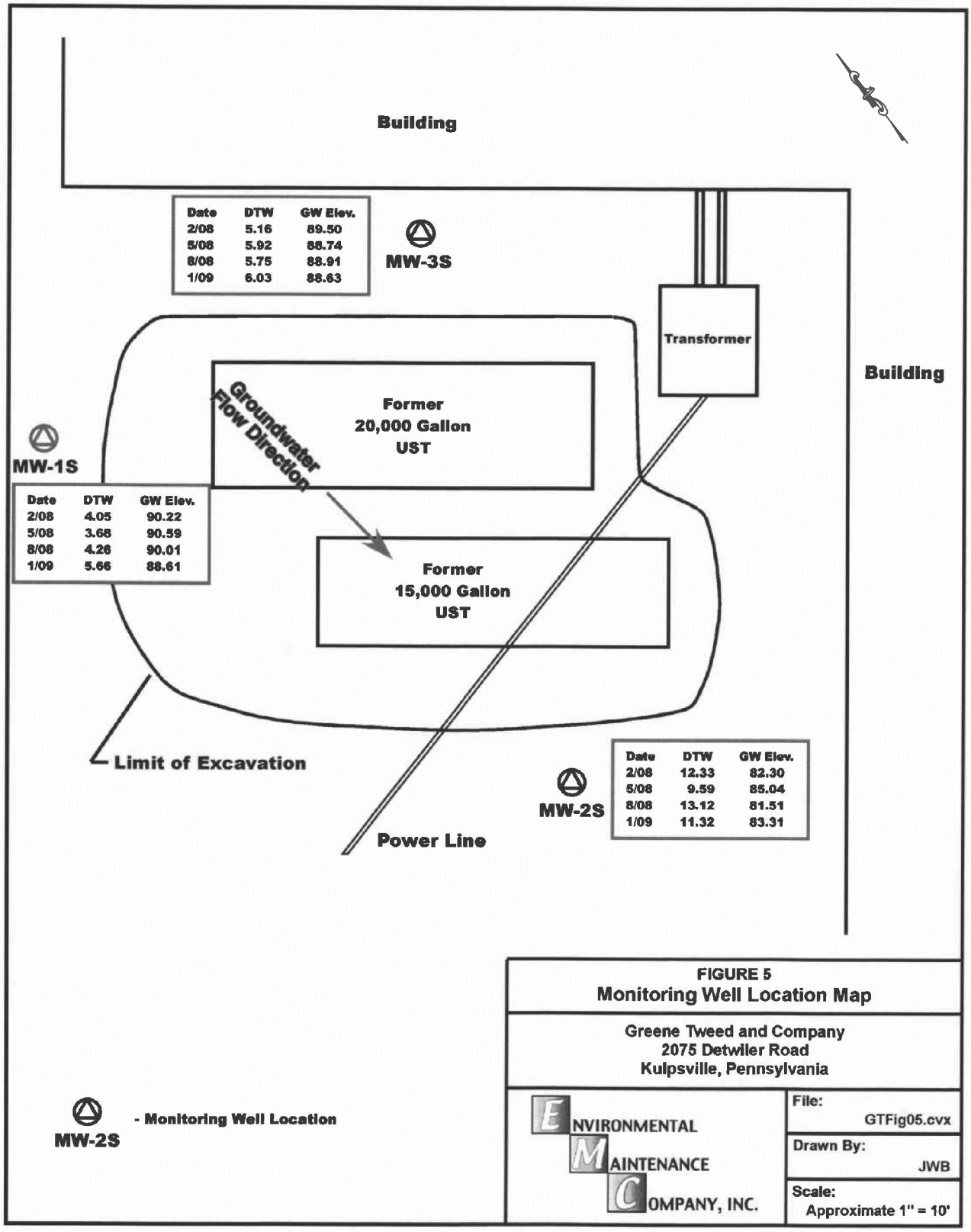
SOURCE: ACT 2 REMEDIATION UPDATE/PLANNED SAMPLING ACTIVITIES, ENVIRONMENTAL MAINTENANCE COMPANY, INC., JANUARY 2003

FIGURE 4
WELL/SUMP LOCATIONS
GREENE, TWEED & CO.
KULPSVILLE, PENNSYLVANIA

SCALE: NOT TO SCALE
DATE: JANUARY 2012
S.O. NO.: 120678
FILE: 120678-GTC-03
DSN/DWN: KAT/WJH
CHK: SRF

Baker
MICHAEL BAKER JR., INC.
MOON TOWNSHIP, PENNSYLVANIA

FIGURE 5



SOURCE: FINAL REPORT, ENVIRONMENTAL MAINTENANCE COMPANY, INC., JANUARY 2009

FIGURE 5
MONITORING WELL LOCATIONS
GREENE, TWEED & CO.
KULPSVILLE, PENNSYLVANIA

SCALE: NOT TO SCALE
S.O. NO.: 120678
DSN/DWN: JBM/RRR
DATE: JANUARY 2012
FILE: 120678-GTC-06
CHK: SRF

Baker MICHAEL BAKER JR., INC.
MOON TOWNSHIP, PENNSYLVANIA

FIGURE 3

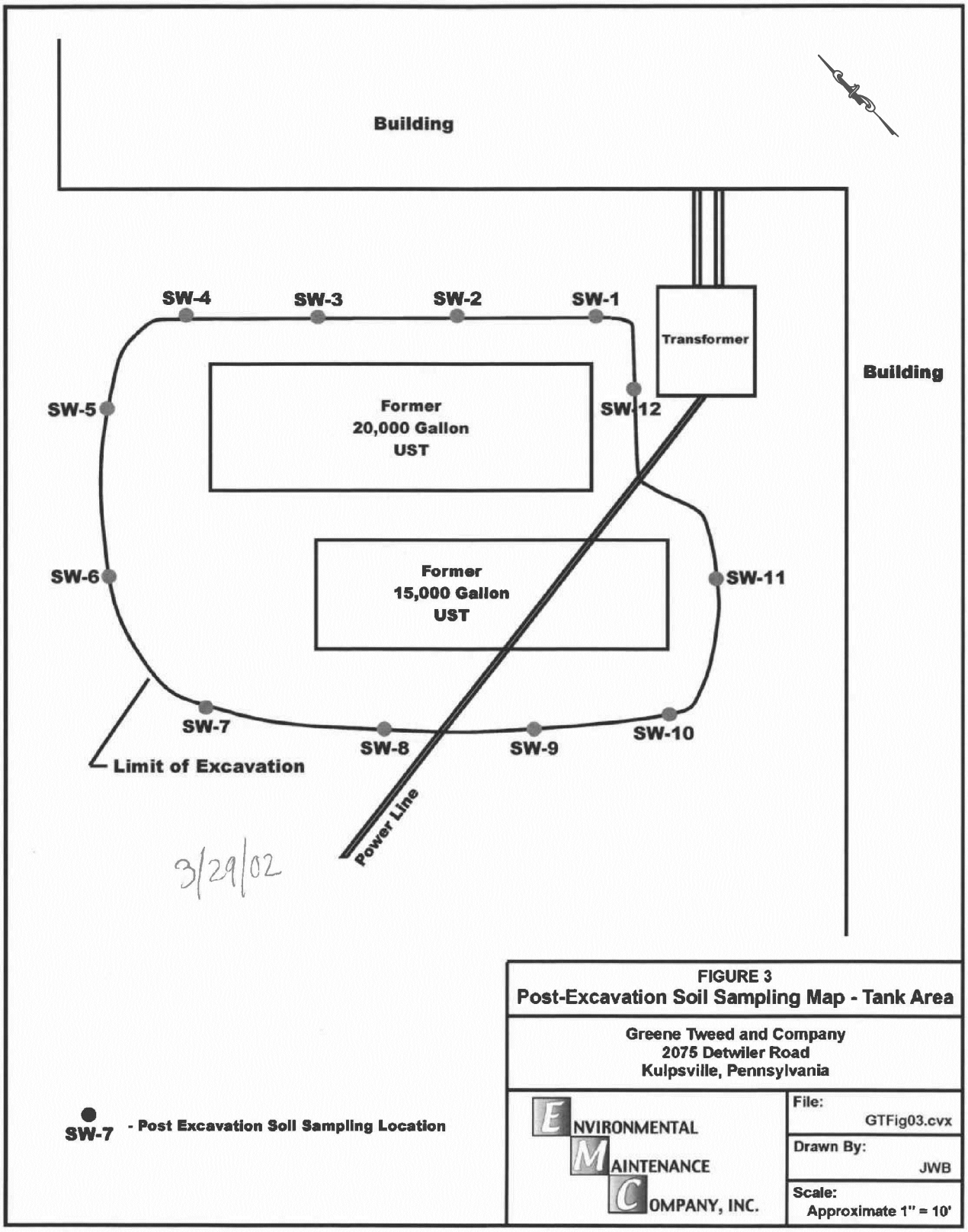


FIGURE 6
POST-EXCAVATION SOIL SAMPLE LOCATIONS – TANK AREA
GREENE, TWEED & CO.
KULPSVILLE, PENNSYLVANIA

SOURCE: FINAL REPORT
ENVIRONMENTAL MAINTENANCE
COMPANY, INC., JANUARY 2009

SCALE: NOT TO SCALE	DATE: JANUARY 2012
S.O. NO.: 120678	FILE: 120678-GTC-04
DSN/DWN: KAT/WJH	CHK: SRF

Baker MICHAEL BAKER JR., INC.
MOON TOWNSHIP, PENNSYLVANIA

FIGURE 4

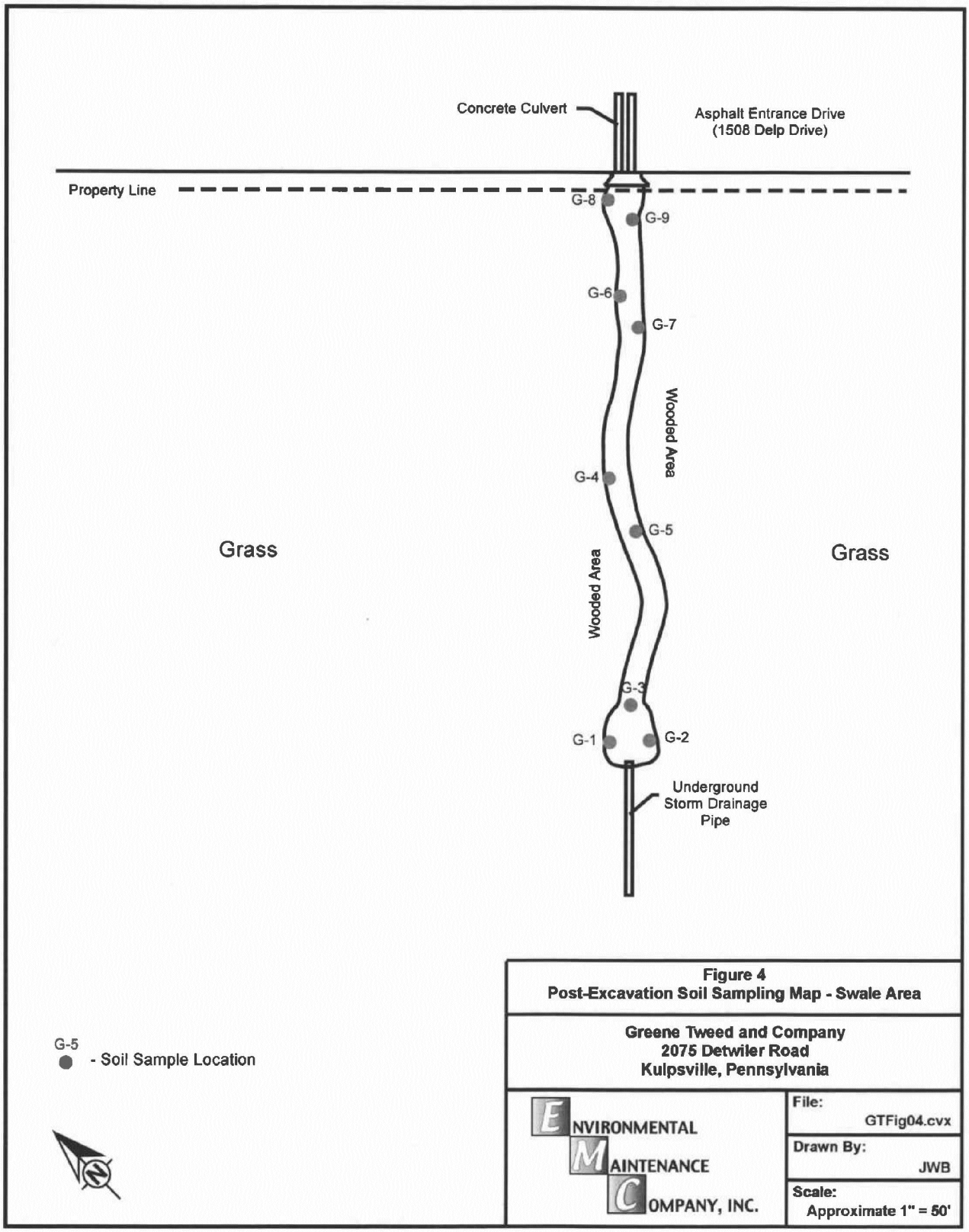


FIGURE 7
POST-EXCAVATION SOIL SAMPLE LOCATIONS - SWALE AREA
GREENE, TWEED & CO.
KULPSVILLE, PENNSYLVANIA

SOURCE: FINAL REPORT
ENVIRONMENTAL MAINTENANCE
COMPANY, INC., JANUARY 2009

SCALE: NOT TO SCALE
S.O. NO.: 120678
DSN/DWN: KAT/WJH
DATE: JANUARY 2012
FILE: 120678-GTC-05
CHK: SRF

Baker
MICHAEL BAKER JR., INC.
MOON TOWNSHIP, PENNSYLVANIA

APPENDIX C

Inventory of Documentation and Reference Documents

The following is a list of documents in the order referenced in the report.

Document Date	Document
September 19, 1989	Preliminary Assessment
January 2009	Final Act 2 Report
April 20, 2011	Montgomery County Recorder of Deeds website
May 18, 1992	North Wales Facility Closed and Sold
WASTES	
August 15, 1980	Notification of Hazardous Waste Activity
November 17, 1980	Part A Hazardous Waste Permit Application
December 22, 1980	Acknowledge Submission
July 23, 1981	Review Process Complete Interim Status Granted
December 31, 1981	Permanent USEPA ID No
February 25, 1983	Request for Part B Hazardous Waste Permit Application
June 28, 1983	NOV
June 17, 1983	Hazardous Waste Inspection
July 15, 1983	No Longer a TSD
July 15, 1983	Correction of Violations
August 1, 1983	PADEP Determined not a TSD
February 2, 1984	Hazardous Waste Inspection
February 14, 1984	NOV
March 13, 1984	Correction of Violations
December 19, 1984	Hazardous Waste Inspection
December 31, 1984	NOV
January 30, 1985	Hazardous Waste Inspection
August 2, 1985	Hazardous Waste Inspection
August 6, 1985	NOV
August 16, 1985	Correction of Violations
June 3, 1987	Hazardous Waste Inspection
June 9, 1987	NOV
June 16, 1987	Correction of Violations
March 28, 1988	Hazardous Waste Inspection
March 30, 1988	NOV
May 12, 1988	Correction of Violations

Document Date	Document
April 19, 1989	Hazardous Waste Inspection with USEPA
March 26, 1992	Hazardous Waste Inspection
October 4, 1993	Hazardous Waste Inspection
November 19, 2001	Hazardous Waste Inspection
March 2, 2005	Hazardous Waste Inspection
February 28, 2006	Hazardous Waste Inspection
February 26, 2007	Hazardous Waste Inspection
March 2, 2007	Correction of Violations
February 18, 2010	Hazardous Waste Inspection
2007-2010	Residual Waste Reports
AIR	
October 24, 1991	Boiler Permit
November 5, 1992	Boiler Inspection
November 24, 1992	Boiler Inspection
November 14, 1995	Boiler Inspection
1980-1992	Fluorimer Operating Permits and Renewals
November 9, 1982	Fluorimer Inspection
October 25, 1983	Fluorimer Inspection
October 30, 1985	Fluorimer Inspection
November 5, 1987	Fluorimer Inspection
November 6, 1991	Fluorimer Inspection
November 24, 1992	Fluorimer Inspection
November 12, 1993	Fluorimer Inspection
December 21, 1994	Fluorimer Inspection
November 14, 1995	Fluorimer Inspection
May 17, 1996	Municipal Notifications for SMOP
May 24, 1996	Permit Application
June 11, 1996	Reviewing Application
October 8, 1996	Operating Permit
July 8, 1994	RFD Can Spraying
December 29, 1995	RFD Exhaust Fans Exempt
October 23, 2001	Minor Modification for Boiler #3

Document Date	Document
December 7, 2001	Inspection
January 17, 2002	Denial of Application
December 5, 2001	Permit Renewal Application
May 29, 2002	Permit Application
June 22, 2004	Technical Review
June 2, 2005	PADEP Technical Review Memo
June 8, 2005	Final Permit Issuance
September 23, 2005	Administrative Amendment
October 27, 2005	Administrative Amendment
September 15, 2008	Electric Oven Notification
January 7, 2010	Renewal Application
1998-2010	Air Emission Inventories
1993-2010	Air Fee Requests and Payments
NPDES	
August 4, 1971	NPDES Permit Application to USCOE
July 26, 1974	PADEP to USEPA - Comments on NPDES Permit Application
August 30, 1974	NPDES Permit PA0012041
May 9, 1975	Facility to USEPA - Redirected Floor Drains to UGTMW Sewer
September 30, 2002	Notice to Include Condensate
December 12, 2002	NPDES Application and PPC Plan
January 7, 2003	Proof of Publication
March 18, 2003	Deny NPDES
July 8, 2003	Response to Denial
October 8, 2003	Draft NPDES Cover Letter
October 24, 2003	Facility Changes to NPDES Draft
November 26, 2003	NPDES Approval
December 5, 2003	Permit Issuance
January 30, 2004	Change in Additives
July 26, 2004	Change in TMDL
January 3, 2008	Inspection
February 29, 2008	Inspection
April 22, 2008	Consent Assessment of Civil Penalty

Document Date	Document
July 3, 2008	DMR
October 3, 2006	Renewal of NPDES
April 8, 2008	NPDES Renewal Application
July 1, 2008	NPDES Permit
STORAGE TANKS	
November 3, 1989	Tank Registration
October 24, 2002	AST Integrity Inspections for ASTs 001A and 002A
September 16, 2011	Facility Communication Regarding Boiler Blowdown USTs
INVESTIGATIONS AND REMEDIAL ACTIONS TO DATE	
1983-1984	Fuel Oil Spill Inspection Reports
September 27, 1983	Facility Spill Report
June 24, 2011	Facility Communication after 2011 Site Visit
August 11, 1992	Soil Sampling Report - Spotts, Stevens, and McCoy
February 8, 2002	PADEP Release Inspection
February 12, 2002	PADEP Call Confirming No Wetland
February 11, 2002	PADEP Release Guidance for Clean Streams
May 1, 2002	NIR
May 8, 2002	PADEP Acknowledge NIR
January 22, 2003	Act 2 Update
September 23, 2003	Quarterly Sampling Reduction Request
February 18, 2004	Well Installation Work Plan
March 1, 2004	PADEP Acknowledge Work Plan
March 19, 2009	Addendum to Final Report
May 5, 2009	PADEP Approves Act 2
INSPECTIONS	
December 8, 1993	Facility Air Inspection
January 3, 1997	Facility Air Inspection
January 26, 1998	Facility Air Inspection
June 1, 1999	Facility Air Inspection
July 31, 2003	Facility Air Inspection
August 11, 2004	Facility Air Inspection
June 28, 2005	Facility Air Inspection

Document Date	Document
December 20, 2007	PADEP Memo Regarding Plant Evacuation
January 15, 2008	Follow-up Inspection
October 20, 2009	Radiation Inspection